THE UNIVERSITY OF TEXAS AT AUSTIN

RECOMMENDATION FOR CHANGE IN ACADEMIC RANK/STATUS

Name: Yeh, Hsin-Chih EID: hy3982 Present Rank: Assistant Professor

Years of Academic Service ***(Include AY 2017-18 in each count)***:

At UT Austin since: 9/1/2012 (month/day/year) Total Years at UT Austin: 6

In Present Rank since: 9/1/2012 (month/day/year) Total Years in Present Rank: 6

Tenure-track only:
Number of Years in Probationary Status: 6

Additional information: N/A

Primary Department: Biomedical Engineering

College/School: Engineering, Cockrell School of

Joint Department: N/A

College/School: N/A

Other Department(s): N/A

Recommendation actions[1]:

By Budget Council/Executive Committee: Promote

Vote[2] for promotion 12; Against 0; Abstain 0; Absent 0; Ineligible to vote 1

By Department Chair: Promote

By College/School Advisory Committee: Promote

Vote[2] for promotion 7; Against 0; Abstain 0; Absent 0; Ineligible to vote 0

By Dean: Promote

Administrative Action: Promote to Associate Professor

Date Action Effective: September 1, 2018
(To be submitted to the Board of Regents as part of the annual budget.)

By: Maria Mc Ini Date: February 15, 2018
For the President

[1]See "Chart of Recommended Actions" for eligible recommended actions applicable to specific conditions and administrative levels.
[2]Record all votes for and against promotion, abstentions by eligible voting members, and the number of absent eligible voting members. The number of committee members ineligible to vote should also be recorded. Enter zero where it would otherwise be blank.

EVPP/4.15

EXHIBIT
P's 159

The University of Texas at Austin
Cockrell School of Engineering

Dean's Assessment
Hsin-Chih (Tim) Yeh
Department of Biomedical Engineering
Cockrell School of Engineering

Dr. Hsin-Chih Yeh received his BS in mechanical engineering in 1994 from the National Taiwan University and his MS in mechanical and aerospace engineering from UCLA in 1998. Between 1998 and 2003, he worked as a senior research and development engineer for Optical MicroMachines, Inc. in San Diego. Dr. Yeh received his PhD in mechanical engineering from Johns Hopkins University in 2008. He served as a postdoctoral fellow at Johns Hopkins and Los Alamos National Laboratory from between June 2008 and July 2012. He joined the Department of Biomedical Engineering at UT as an assistant professor in September 2012. If promoted to associate professor in September 2018, he will have accumulated six years of probationary service.

Dr. Yeh creates new nanomaterials that can be used as molecular probes, and develops new imaging tools for studying individual cells and molecular processes. His work provides new techniques for studying the dynamics, kinetics, and signaling of various processes in cells and tissues. Long-term, his work could lead to new techniques for disease detection and diagnosis. His work is central to biomedical imaging and instrumentation, which is one of the four core research areas within the Department of Biomedical Engineering.

Eight external letters were submitted as part of the promotion dossier, with four letter writers recommended by Dr. Yeh and four selected by the budget council. All the letter writers are faculty at US institutions: Columbia[1], Duke, Georgia Tech, Johns Hopkins, Penn, Rice, UC Irvine, and UCLA. One letter writer is a member of the National Academy of Engineering (NAE), and one is a member of the National Academy of Sciences (NAS). Two letter writers recommended by the budget council did not respond, and one recommended by the budget council declined citing lack of time and personal family issues.

Teaching
While in rank, Dr. Yeh has taught two undergraduate courses and two graduate courses:

- BME 113L/313L, *Introduction to Numerical Methods*
  Required undergraduate course
  Taught three times (average enrollment of 105 students)
  Instructor ratings: 3.8 to 4.4 | Course ratings: 3.2 to 3.9
- BME 354, *Molecular Sensors and Nanodevices for Biomedical Applications*
  Undergraduate elective
  Taught three times (average enrollment of 20 students)
  Instructor ratings: 4.6 to 4.8 | Course ratings: 3.9 to 4.4

[1] Technically, Dr. Leong is not arms' length because he is a co-author on a paper with Dr. Yeh. However, this paper involved researchers at multiple universities and Dr. Leong and Dr. Yeh did not collaborate directly.

- BME 381J, *Fluorescence Microscopy and Spectroscopy*
  Graduate elective
  Taught two times (average enrollment of 16 students)
  Instructor ratings: 4.2 to 4.8 | Course ratings: 4.0 to 4.5
- BME 385J, *Biomedical Micro- and Nanotechnology*
  Graduate elective
  Taught one time (enrollment of 7 students)
  Instructor rating: 4.8 | Course rating: 4.7

With the exception of the first time that Dr. Yeh taught a class with 100 students, his instructor ratings in individual courses have not fallen below 4.1. Senior faculty conducted peer evaluations in Prof. Yeh's courses four times. The comments about his lecture style and interactions with students are uniformly positive. Dr. Yeh attended the 2015 National Effective Teaching Institute, sponsored by the American Society for Engineering Education, and the Student Engineering Council recognized him with the Outstanding Faculty Award for the Department of Biomedical Engineering in 2016.

Research

Dr. Yeh's research is focused in two main areas: the development of novel nano-probes and sensors, and the development of new microscopy methods for tracking single molecules and particles. This microscopy method is called TSUNAMI (Tracking Single particles Using Nonlinear And Multiplexed Illumination), and allows three-dimensional tracking of the dynamics of molecules within cells with nanometer spatial precision. Highlights of his research accomplishments at UT include:

- 14 archival journal publications in rank (33 total). He has published 14 journal papers with his students at UT.
- Many of his papers in rank are published in high impact journals, such as *ACS Nano* (IF=13.9), *Journal of the American Chemical Society* (13.9), *Nature Communications* (12.1), and *Biophysical Journal* (3.6).
- 1 US patent awarded, 1 US patent application filed, and 1 international patent application filed in rank.
- An h-index of 21 (Google Scholar) and 2,670 citations

While in rank, Dr. Yeh has secured five research grants totaling $1.4 million in external funding (his share is $0.98 million). He is the PI on all five awards. He received an R21 award[2] from the National Institutes of Health (NIH) with a co-PI in BME and a co-PI from MD Anderson, and an award from the National Science Foundation (NSF) with a co-PI at Furman University. He has also received individual investigator awards from the Texas 4000 Foundation and the Welch Foundation.

The letters from the eight external reviewers were uniformly positive and identified his specific contributions to the field of single molecule tracking. Dr. Andrew Tsourkas (Department of Bioengineering, Penn) noted that Dr. Yeh's external funding was "not earth shattering," and then commented that it was "on par with what I have seen from many others going up for tenure."

[2]NIH Exploratory/Developmental Research Grant Award (R21)

Advising and Student Mentoring
Dr. Yeh has graduated two PhD students in rank (1 co-advised). In addition, Prof. Yeh acted as a research mentor to one student who earned his PhD from UT in 2014 after his primary advisor (John Zhang) relocated to Dartmouth University. Dr. Yeh also mentored one postdoctoral fellow. Dr. Yeh is currently supervising four PhD students.

While in rank Dr. Yeh has advised 20 undergraduate students, six of whom have contributed to journal publications from his lab.

University Service
Dr. Yeh has served on six departmental committees, and is currently chair of the Graduate Studies Committee for BME. At the Cockrell School level, he is an active member of the Ad Hoc Math Curriculum Committee, which is working to address issues in the math curriculum for first- and second-year engineering students. Dr. Yeh has been also served as a mentor for the Taiwanese Student Association and the Travis County Christian Assembly Chinese Campus Fellowship.

Professional Service
Dr. Yeh's professional service has primarily been related to paper and proposal review. He has also served as session chair and/or on the technical program committee for several national and international conferences.

Other Evidence of Merit or Recognition
Dr. Yeh was one of two former postdoctoral associates to receive a Postdoctoral Publication Prize by Los Alamos National Laboratory in 2013. His teaching was also recognized with an Outstanding Teaching Award by the Student Engineering Council in 2016.

Overall Assessment
Dr. Yeh has developed a reputation as an outstanding researcher and has established a strong, sustainable research program. His teaching of both undergraduate and graduate courses is also outstanding. He has provided an appropriate level of service to the BME department and UT Austin, but has not assumed leadership roles outside the university.

Overall, I believe that Dr. Yeh's performance exceeds expectations in the areas of teaching and research and meets expectations in the area of service. Accordingly, I am pleased to provide my strong recommendation that Dr. Yeh be promoted to associate professor with tenure.

Sharon L. Wood, Dean
6 November 2017

COCKRELL SCHOOL OF ENGINEERING
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Department of Biomedical Engineering Chair's Statement for Promotion

Candidate Name: **Hsin-Chih "Tim" Yeh**

Prepared by: **Shelly Sakiyama-Elbert, Ph.D., Department Chair**

Preparer Signature:

Budget Council Recommendation

The Department Budget Council (BC), consisting of all full professors in the department, met on September 7, 2017 to discuss the department's promotion and tenure cases. The promotion dossiers of the candidates, including the BC assessments, were made available to the BC in electronic form (UTBox) prior to the meeting. At the meeting, a vote was conducted by secret paper ballot rating the candidates on each of the areas of evaluations, as well as an overall recommendation on promotion. Of the 13 BC members (including the Department Chair), all 13 attended the meeting and participated in the discussion.

At the meeting, the BC statements were presented by the member responsible for assessing that area (teaching, research, advising, service, or honors). Dr. Yeh's teaching was discussed by the BC, and it was noted that he has compiled an excellent record of teaching. BME's teaching load expectation is one course per long semester. He taught two undergraduate courses 3 times each in rank: a sophomore level core course, BME 113L/313L - Introduction to Numerical Methods in Biomedical Engineering, and a senior level elective BME 354 Molecular Sensors and Nanodevices for Biomedical Applications. He also taught two graduate courses, BME 381J Fluorescence Microscopy and Spectroscopy (twice) and BME 385J Biomedical Micro- and Nanotechnology (once) while in rank. His average graduate Overall Instructor CIS rating is 4.6 and his average undergraduate Overall Instructor CIS rating is 4.1 for required courses and 4.7 for elective courses. These exceed the average CIS OI score for both undergrad and grad courses amongst BME Assistant Professors (4.08/4.17) and meets the average for all BME professor ranks (4.1). He clearly exceeds the expectations of the department with respect to teaching.

Dr. Yeh's research productivity in rank was discussed next. While in rank, he has published 14 peer-reviewed journal articles, with 12 of these as last/corresponding author. All of these publications are primary research articles rather than reviews. These 14 publications represent just under half of his total publications (33). He also had 4 peer reviewed conference proceedings in rank. All of his 14 papers included UT-supervised students as co-authors. His career H-index is 20 (Google Scholar)/16 (ISI) with 2603/1886 career citations, which well exceeds the expectation for promotion to Associate Professor in the field (8-12).

The external letters of evaluation were discussed, and it was pointed out they are all from highly regarded experts in the field. The letters were noted to be uniformly positive, and the BC remarked on the clear contributions of Dr. Yeh. The letter writers included one

member of the National Academy of Science (15c), 1 member of National Academy of Engineering (15d) and one department chair of a state public university (15f). One writer (15c) is also a Howard Hughes Medical Investigator (HHMI) and member of the American Academy of Arts and Sciences. Several are from peer public institutions, such as UCLA and GA Tech (15b and 15d) and aspirational peer BME programs, such as Rice, Penn, Duke, Columbia and Johns Hopkins, (15a, 15h, 15e, 15g, and 15c). All are thought leaders in the fields of single molecule engineering research, chemistry, and/or biophysics. It was noted that overall the letters were very strong, and all explicitly recommended in favor of promotion.

The BC specifically discussed Dr. Yeh's development of novel nano-probes and sensors for tracking microscopy techniques to monitor dynamics, kinetics, and signaling of various processes in cells and tissue. He has also developed novel methods for single molecule imaging (TSUNAMI). They noted that the letters comment on the rigor of his work and his precise methodical approach to his research. Based on both the budget council review and the external letters, Dr. Yeh clearly meets or exceeds the expectations for promotion to Associate Professor.

Dr. Yeh's contributions to advising were noted. He has supervised 20 UG researchers while in rank, eight of whom have been co-authors on publications (9 total). He has supervised 3 PhD students to completion in rank (2 co-mentored) and currently is mentoring 2 PhD students. His PhD students have gone on to excellent positions in industry (ASML, Inc. or as post-docs for National Labs/Nanobioscience Centers). He also mentored 1 post-doc while in rank, who has gone on to a position with Luna Innovations. Dr. Yeh has also been the faculty sponsor for two student organizations: Travis Christian Assembly Chinese Campus Fellowship and Taiwanese Student Association. Through these two groups, he works to help students feel welcome and build community at UT Austin. In summary, Dr. Yeh is an outstanding advisor for his mentees and meets or exceeds expectations for promotion to Associate Professor.

During his time in rank, Prof. Yeh took on numerous service roles in the department including membership on the Graduate Studies Executive Committee, which he has recently agreed to Chair for AY17-18. During his time on the GSC Exec, he has been involved in revising the rotation system for first year graduate students and helping to devise the curriculum for the MS/MD program with the Dell Medical School. He has also served on the Cockrell School of Engineering Ad Hoc Math Curriculum Committee to help improve undergraduate student success and streamline the math curriculum. This plan was implemented in 2015 and has reduced the Q drop/failure rate in the first semester of math. He will be serving on this committee again in the coming year to address success in subsequent semesters of math that are required for engineering students. Dr. Yeh always has a positive can-do attitude toward problem solving that makes serving on committees with him a pleasure.

Dr. Yeh's service to the profession has included chairing sessions and serving on technical programing committees for IEEE (Nano/Molecular Medicine) and BMES. He has also served as a reviewer for the NSF and numerous scientific journals in the field. He is also an active speaker in the community surrounding UT Austin promoting STEM education in a variety of settings. His service meets or exceed the expectations of the department for promotion to Associate Professor.

Dr. Yeh's awards include the 2016 Outstanding Faculty Award for BME from the Student Engineering Council. He is particularly proud of this award because it is selected based on student feedback and represents recognition of his dedication to student learning and mentorship. He has been invited to speak at some of the top BME programs around the country including Johns Hopkins, U Penn, Rice, and Columbia. He has also given several international talks in Taiwan and Denmark. His awards meet or exceed the expectations of the department for promotion to Associate Professor.

Overall, the BC felt that the case for Prof. Yeh was a strong one, and that he easily meets or exceeds the expectations for promotion to Associate Professor in the BME department. In the BC vote, 12 BC members voted and the final vote was 12 For, 0 Against, 0 Abstain, 0 Absent. The Chair's vote in not included in this tally. This represents a very enthusiastic endorsement from the BC for the promotion of Prof. Yeh to Associate Professor.

Chair's Assessment

I found the letters of evaluation for Dr. Yeh to be compelling. These letters are from a group of experts who are known for their depth of thought, mentorship, and innovation in Dr. Yeh's field. They comment on the revolutionary nature of his work with respect to tracking single molecule position within cancer cells. I include for you below some brief excerpts that I found to be especially persuasive.

Dr. Gang Bao, Rice University
"Tim built two state-of-the-art 3D single-molecular tracking microscopes to investigate the internalization, transport and signaling dynamics of biomolecules such as membrane receptors, viral capsids and drug molecules in live cells and tissue. This innovative imaging method has the potential to provide a better understanding of the mechanisms involved in the development of various diseases including cancer by allowing researchers to visualize the transport dynamics of biomolecules in 3D tissue."

Dr. Robert Dickson, Georgia Tech
"One of Professor Yeh's most significant contributions has been his advances with new silver nanocluster-based fluorophores encapsulated in single-stranded DNA. My own group initially created these novel emitters in 2004, but Professor Yeh has actually made these materials into useful biosensors – a feat that we were unable to do."

Dr. Taekjip Ha, Johns Hopkins
"I have no doubt that his research accomplishments will grant him tenure at major research institutions including my current (Johns Hopkins U) and previous (UIUC)."

Dr. Chih-Ming Ho, UCLA
"At UT Austin, Tim continues to produce high volume, original and innovative researches in sensor area, but in a new direction. He has created an independent domain of research, such as the noble metal based nanocluster beacon and 3-D single molecule tracking technique.... These techniques developed by Tim will be able to push the envelope of understanding cellular omics far beyond the current state of art."

Dr. Tony Huang, Duke
"Everything I know of Tim suggests that he is a **superstar** in academia, and has already made significant impact in micro- nano-technologies in general, and most especially in the field of nanomedicine… This TSUNAMI microscope is truly revolutionary in several ways. First, not only does it achieve super resolution in tracking receptor motions, but it also beats the conventional camera-based tracking systems in reaching ultrahigh temporal resolution. Second, TSUNAMI allows for fluorescence lifetime measurements on the tracked particles, which cannot be achieved by the conventional techniques."

Dr. Kam Leong, Columbia
"On research, the work of Dr. Yeh is marked by innovation. He has excelled in developing noble metal nanoclusters as low-cost nanoprobes for bioimaging, applicable to detection of nucleic acid methylation, enzyme activity, and single-nucleotide polymorphism."

Dr. Andrew Tsourkas, Penn
"A notable feature of all of Dr. Yeh's work is his thoroughness and attention to detail. This instills a great deal of confidence in the findings that are reported and provides a nice contrast to the majority of the work in the field that is obviously often rushed into publication without being carefully scrutinized or sufficiently investigated. Because of the quality of Dr. Yeh's work, he has gained a great deal of respect from his colleagues and peers."

Table 1.

Name	Rank	School	PhD Year	Hire Yr	Prom yr	ISI Career	ISI H Index Career	Google Scholar Career	Google Scholar H Index
Moran Bercovici	Asst	Technion	2010	2011	N/A	311	9	634	14
Tim Yeh	**Asst**	**UT**	**2008**	**2011**	**2018**	**1886**	**16**	**2603**	**20**
Randall Goldsmith	Assoc	U Wisc	2007	2011	N/A	663	12	N/A	N/A
Audrey Ellerbee Bowden	Assoc	Stanford	2007	2010	2017	620	13	1265	17
Julie Biteen	Assoc	U-Mich	2006	2010	2017	1321	16	2579	21
Phil Santangelo	Assoc	GA Tech	1998	2007	2013	758	16	2117	23

Dr. Yeh has been well cited during his time in rank, as shown in Table 1, above. ISI show 1886 citations of his work during his time in rank and Google scholar show 2603 citations. His ISI H-index in rank and total citations are comparable to Dr. Biteen who was promoted effective this year to Associate Professor at Michigan. Dr. Yeh shows an H-index of 20 in Google Scholar, which is very impressive for at this career stage.

Dr. Yeh has shown sustained research funding in rank totaling $1.4M in total costs (Candidate's share $975k), which meets the expectations for that of associate professors in the field of single molecule imaging. Due to the nature of his work, less funding is required to sustain a research program than for an experimental group of comparable size that performs a cell culture or animal studies regularly. Moreover, his funding has come from several sources, including NIH, the Welch Foundation and NSF, which is beneficial in this era of tight funding.

There was some comment about Dr. Yeh's current funding in Dr. Lee's letter as "just turning the corner". But in examining Dr. Yeh's funding, he has had the typical trajectory of an assistant professor who is gradually ramping up the size of his research program. Dr. Yeh is an active collaborator with Scientists at UT Austin, MD Anderson and Furman University and holds active research grants with collaborators at all 3 institutions. In his area of biomedical engineering, these collaborations are both necessary to accomplish complex research and expected by many funding agencies including NIH. Dr. Lee also comments that Dr. Yeh's work is "solid" which might be viewed as neutral to negative remark. However, Dr. Lee does admit to not being as close to Dr. Yeh's field as some other letter writers, and several of them comment on the revolutionary nature of his work.

Dr. Yeh is an outstanding teacher who truly cares about his students. The senior faculty commented in their peer teaching observations that Dr. Yeh is passionate about teaching and clearly communicates to his class that he is committed to helping them learn. His recognition with the Outstanding Faculty Award in 2016 from the Student Engineering Council reinforces these observations. It is impressive to see this award given to the instructor for a sophomore course because for many of the BME students, sophomore year is the first time they encounter real engineering coursework and the challenge of more open-ended problems. This can be a new and difficult experience for the very bright students at UT, who are on average from the top 3% of their high school classes. Commitment to student success from outstanding faculty, such as Dr. Yeh is critical to retaining students in engineering and keeping them on track to graduate in 4 years.

I will also comment that Dr. Yeh is a true citizen of the department. He gladly takes on service and leadership roles and contributes fully to shaping a better educational culture. He was truly excited to continue to serve on the Ad Hoc Math Committee for Engineering when invited last spring. He also gladly accepted the request to take over as chair of the GSC Exec and in less than 2 weeks has made a significant dent in the list of tasks we discussed to tackle for the upcoming year. All this was done with a brand-new Graduate Coordinator, who had been on the job for 7 days and came to the position from outside of UT.

Two areas for future research growth could be identified: (1) Dr. Yeh proposes exploration of taking his single molecule tools into exploration of regulatory RNA via collaboration with Prof. Pengyu Ren in our department. They are actively pursuing some of these questions and have submitted an NIH R01, with potential supplemental applications to NCI-IMAT R33 and DOD-CDMRP mechanisms. (2) Dr. Yeh has seed funding from Texas 4000 that explores development of a potential new biomarker for early detection of a highly fatal type of prostate cancer. This research is gathering data quickly thanks to the seed grant and will be part of an NIH R01 proposal to fully explore these questions and method applications. These are two examples of

how Dr. Yeh has started to expand his research to additional areas of application, where we expect to see additional growth in the future.

The Faculty Evaluation Committee of the BME Budget Council presented its final third-review assessment of Dr. Yeh on April 24, 2015. The evaluation and recommendation of the committee is provided below:

> After careful evaluation of Dr. Yeh's record in teaching, student supervision, scholarly output, research support, service and external recognition, this Committee concludes that Dr. Yeh meets the expectations for third year review productivity set forth by the Biomedical Engineering Department and the Cockrell School of Engineering.

The department chair at that time, Dr. Peppas, concurred with these findings and assessment that Dr. Yeh was meeting expectations of BME and the Cockrell School of Engineering for his career stage at third-year review.

In summary, Dr. Yeh has developed an outstanding research program in engineering nanobiosensors, nanodevices, and imaging techniques for single-molecule and single cell tracking and detection. He has built an innovative and exciting independent research program during his time as an Assistant Professor. He is an excellent teacher and advisor in the department, demonstrating a strong commitment to teaching at all levels and showing willingness to serve the Department, the University and the Profession wherever he is needed. He has met or exceeded the expectations for promotion to Associate Professor in Biomedical Engineering. I fully expect him to continue to excel in research, teaching and service for many years to come. I give him my strongest endorsement for promotion to Associate Professor.

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MEMORANDUM

To: Gerald E. Speitel, Jr., Ph.D.

From: Nicholas A. Peppas, Sc.D.

Date: April 24, 2015

Re: Third Year Review for Dr. Tim Yeh, Spring 2015

As Chair of the Department of Biomedical Engineering, I concur with the findings of the committee for the third year review of Dr. Tim [Hsin-Chih] Yeh. These findings were discussed with Dr. Yeh on April 24, 2015.

Please review the appended evaluation by his committee. I am very pleased and agree with this assessment.

Please let me know if you have any questions at all.

NAP:cnc

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April 11, 2015

TO: Dr. Nicholas Peppas, Sc.D.
Chair, Department of Biomedical Engineering

FROM: Department of Biomedical Engineering Third Year Review Committee: Dr. Thomas E. Milner, Dr. H. Grady Rylander, III, and Dr. Stanislav Y. Emelianov (Committee Chair).

Subject: **Third Year Review of Professor Tim [Hsin-Chih] Yeh**

The Budget Council Committee formed by Department Chair Nicholas Peppas of the Department of Biomedical Engineering has reviewed the third year progress of Assistant Professor Tim Yeh. The Committee has carefully considered Dr. Yeh's professional accomplishments during the past three years as an Assistant Professor and concludes that Professor Yeh meets the expectations set forth by the Cockrell School of Engineering and the University of Texas at Austin.

Teaching:

Semester Year	*Course*	*Stus*	*CIS Instructor*	*CIS Course*
S/13	BME 385J – BME Micro & Nanotechnology	7	4.8	4.7
F/13	BME 381J – Fluorescence Micro-/Spectroscopy	16	4.2	4.0
S/14	BME 113L – Intro to Numerical Methods in BME	102	3.8	3.2
F/14	BME 354 Molecular Sensors/Nanodevelopment for BME Applications	20	4.6	3.9

Dr. Yeh has taught two graduate and two undergraduate courses: BME 385J (ChE 384) Biomedical Micro and Nanotechnology (Spring 2013, graduate course, instructor/course rating **4.8/4.7**), BME 381J Fluorescence Microscopy and Spectroscopy (Fall 2013, graduate course, instructor/course rating **4.2/4.0**), BME 113L Introduction to Numerical Methods in Biomedical Engineering (Spring 2014, undergraduate course, instructor/course rating **3.8/3.2**), BME 354 Molecular Sensors and Nanodevices for Biomedical Applications (Fall 2014, undergraduate course, instructor/course rating **4.6/3.9**). With the exception of one isolated instance of securing an instructor rating of 3.8 (the first time he taught the course), the candidate has always earned instructor rating of above 4.2 for the graduate course and 4.6 for the undergraduate course, which indicates a commendable teaching record. The average

instructor ratings for both undergraduate and graduate teaching are above the CSE averages for Assistant Professors.

Graduate student comments from the Dr. Yeh's first class (Spring 2013 BME 385J) included: "The professor showed much enthusiasm when teaching!" "Dr. Yeh's course was very well organized and has been very useful to me already." In Fall 2014, students commented "Dr. Yeh presented the subject material in a way that made it interesting for the students." "I really enjoyed Dr. Yeh's lectures. He's incredibly enthusiastic and was always available to meet and discuss things outside of lectures." However, a few constructive comments were also made: "However, the topics were often very disjointed and confusing, and Dr. Yeh often went very in depth into applications without really solidifying the theory and basic concepts first." "I think the course could benefit from a little bit more structure in each lecture, …" "My only suggestion for improvement is to hand back homework before exams."

Undergraduate students in BME 311L noted: "Great instructor." "Dr. Yeh is a great professor." "I really appreciate you taking the time to get to know your students, access the progress of students in the class, and make changes where necessary." They also noted that "Workload was extremely excessive for a one-hour course." and "The lectures were very disconnected from the lab portion." which resulted in somewhat lower instructor/course rating. Dr. Yeh surveyed the class and made necessary adjustments that should result in more consistent coverage of the material and learning experience of our students. Indeed, Dr. Yeh's next undergraduate course was a "Fantastic class", and students noted that "Without a doubt, Dr. Yeh has been one of the most influential professors I've had at UT." "Dr. Yeh is very interested in his students and is a great professor!!!!!" and "As senior of biomedical engineering I would like to say that Dr. Yeh has been the most interesting, entertaining, and knowledgeable professor I have ever taken." It is clear that Dr. Yeh's teaching is very good and is improving over time.

One peer evaluation report was submitted by Prof. Emelianov for BME 113L. The evaluation include narrative assessments, which was very positive and noted Dr. Yeh's command over the subject, his ability to use slides and white board for presentation and discussion, and the organization of the lecture including references to past and future lectures/topics. Prof. Emelianov gave Dr. Yeh an overall "Excellent" rating, the highest out of four ratings. Prof. Emelianov noted "While some minor improvements can always be made, Prof. Yeh is a very good if not an excellent teacher."

Research & Publication Record: Dr. Yeh's research is focused on 1) creating and studying new nanomaterials to serve as molecular probes (e.g. nanobiosensors) with unprecedented sensing capabilities, and 2) developing new imaging tools for fundamental biomedical research at the single-molecule, single-cell level. Dr. Yeh current research is supported by Robert A. Welch Foundation ($180,000 for 3 years) and Texas 4000 Foundation ($25,000 for one year). Furthermore, a recently submitted NIH R21 proposal to develop an integrated imaging tool for probing EGFR subcellular trafficking in real time will be funded ($690k total, $315k candidate portion, 3 year support). Finally, several large scale multi-year collaborative grant applications were submitted to NIH, DoE and NSF with Dr. Yeh serving as a Principal Investigator. Overall, Dr. Yeh's current research funding is consistent and adequate.

Overall, Dr. Yeh has published 22 peer-reviewed archival publications, three of which were published since his arrival to the University of Texas at Austin in 2012. All papers are published in well-regarded journals including Nature Materials, Biophysical Journal, etc. Importantly, the most recent two publications appear in ACS Nano (impact factor: 12) and Nanoscale (impact factor: 6.7) – these and other journals are considered top journals in the field. Finally, Dr, Yeh's recent work is patent-pending

and under review in Nature Communications – supporting the committee's view of the trajectory of Dr. Yeh's research and publications.

In addition to peer-reviewed archival publications, Dr. Yeh has twenty-five refereed peer-reviewed conference proceedings and abstracts, at least sixteen of which are while in rank at UT-Austin. The primary conference venues have been meetings of Biomedical Engineering Society and SPIE Photonics West. One paper won a Young investigator Award at SPIE Photonics West (2015). Dr. Yeh has given 15 invited lectures, at least six of which are related to his research activities at UT-Austin.

Advising, Counseling, and Other Student Services: Dr. Yeh is currently sole-supervisor of two Ph.D. students and one Ph.D. student is co-supervised with Professor Andrew Dunn of BME Department. He is also supervising 1 postdoctoral fellow. He is currently directing a research group comprising of three graduate students, one post-doctoral fellow, two visiting scholars, and five undergraduate students.

Overall, Dr. Yeh's track record in advising students and his pipeline of doctoral students indicates an active record of mentoring and student advising. Two students are in the third year of PhD studies and should graduate before Dr. Yeh's is considered for promotion. He is an active member of several committees involving mentoring students including the Graduate Admissions Committee, and Executive Committee of BME GSC.

Administrative and Committee Service: Dr. Yeh's service to the Biomedical Engineering Department includes membership in the following committees: Chair of International Graduate Admissions Committee (2014-present), Executive Committee of BME Graduate Studies Committee (2014-present), Seminars Committee (2014-present), Faculty Search Committee (2014), Awards Committee (2013-present). In addition, in 2013-2014, Dr. Yeh served on an Ad Hoc Committee for Math Reform for Cockrell School of Engineering.

Dr. Yeh has served on nine qualifying exam committees. He also served on nine dissertation committees. At the National level, Dr. Yeh has served on the National Science Foundation Grant Review Panel for Electrical, Communications and Cyber Systems Division in 2013.

Honors and Awards: Professor Yeh has begun to distinguish himself professionally since he started as an Assistant professor in 2012. In 2015, Dr. Yeh's graduate student won PicoQuant Young Investigator Award at 2015 SPIE Photonics West Symposium.

Overall Assessment: After careful evaluation of Dr. Yeh's record in teaching, student supervision, scholarly output, research support, service and external recognition, this Committee concludes that Dr. Yeh meets the expectations for third year review productivity set forth by the Biomedical Engineering Department and the Cockrell School of Engineering.

Concerns:

1) Dr. Yeh taught 4 different courses. He needs to be assigned to some UG courses for a few more times to show consistency and improvement. BME 113L is the lowest rank – should this be offered by him a few more times?
2) Some teaching comments are negative (including language barrier) – needs to be addressed by next peer evaluation.

3) Dr. Yeh's collaborative nature of research (with Dr. Dunn, Dr. Baker and with MDACC) is great but is it at expense of the independence?
4) Dr. Yeh's BME services are fine, not sure about CSE and University?
5) Honors and Awards: always need more. Dr. Yeh should be encouraged to give some invited lectures.

THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering
Standard Resume

FULL NAME: Tim [Hsin-Chih] Yeh **TITLE:** Assistant Professor

DEPARTMENT: Biomedical Engineering

CITIZENSHIP: U.S.

EDUCATION:

National Taiwan University	Mechanical Engineering	BSME	June 1994
University of California, Los Angeles	Mechanical and Aerospace Engineering	MSMAE	May 1998
Johns Hopkins University	Mechanical Engineering	PhDME	April 2008

PROFESSIONAL REGISTRATION, LICENSURES, CERTIFICATIONS:

CURRENT AND PREVIOUS ACADEMIC POSITIONS:

University of Texas at Austin	Asst. Professor	Fall 2012-now

OTHER PROFESSIONAL EXPERIENCE:

Optical MicroMachines, Inc.	Senior R&D Engineer	Aug. 1998-Mar. 2003
Johns Hopkins	Postdoctoral Fellow	Jun. 2008-Dec. 2008
Los Alamos National Laboratory	Postdoctoral Research Associate	Jan. 2009-July. 2012

CONSULTING:

Bioo Scientific, 5/30/2013 – 6/2016

HONORS AND AWARDS:

- 2016 Outstanding Faculty Award for the BME department from the Cockrell School of Engineering and the Student Engineering Council, University of Texas at Austin (4/20/2016).
- 2013 Postdoctoral Publication Prize in Experimental Sciences at Los Alamos National Laboratory (12/18/2013).
- 2011 R&D 100 Award on "NanoCluster Beacons", primary developer (6/22/2011).
- Best conference paper award in the 6th Annual IEEE International Conference on Nano/Micro Engineered and Molecular System, 2011 (2/22/2011).
- Graduate student fellowship, Johns Hopkins, 2004

Student Awards at UT:

- Rohan Vasisht, 3rd place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2017
- Rohan Vasisht, Undergraduate Research Fellowship ($1000), 2017

- Nina Chen, Scholarship from Ministry of Education in Taiwan (Government Scholarship to Study Abroad), 2017
- Nina Chen, Graduate Engineering Travel Grant from Cockrell School of Engineering ($500), 2017
- Allen Liu, Student Travel Award from the Single-Cell Biophysics Conference ($1000), 2017
- Nina Chen, Travel Award from the q-bio summer school, 2017
- Karena Yu, Undergraduate Research Fellowship ($1000), 2016
- Allen Liu, Scholarship from Ministry of Education in Taiwan (Government Scholarship to Study Abroad), 2016
- Mary Gwozdz, Undergraduate Research Fellowship ($1000), 2015
- Darren Imphean, Undergraduate Research Fellowship ($1000), 2015
- Peter Yu, Undergraduate Research Fellowship ($1000), 2015
- Ajay Rastogi and Peter Yu, 1st place at the Engineering World Health Annual Design Competition, 2015
- Ajay Rastogi and Peter Yu, 3rd place at the National Institutes of Health's Design by Biomedical Undergraduate Teams (DEBUT) Challenge, 2015
- Darren Imphean, 2nd place at the 2015 Spring BME Undergraduate Research Poster Competition, 2015
- Darren Imphean, 1st place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2015
- Evan Perillo, PicoQuant Young Investigator Award in the Single-Molecule Spectroscopy and Imaging session at the SPIE Photonics West BiOS conference, 2015
- Allen Liu, North America Taiwanese Engineering & Science Association (Dallas-Chapter) Scholarship, 2014
- Darren Imphean, Undergraduate Research Fellowship ($1000), 2014
- Kevin Varghese, Undergraduate Research Fellowship ($1000), 2014
- Ben Hoang, Undergraduate Research Fellowship ($1000), 2014
- Peter Yu, Undergraduate Research Fellowship ($1000), 2014
- Austin Batson, 1st place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2013

DISCLOSURES, PATENTS PENDING AND PATENTS AWARDED

1. (at UT) **H.-C. Yeh**, *J.M. Obliosca*, *Y.-A. Chen, C. Liu, Y.-L. Liu*, "LNA thymidine monomer enables differentiation of the four single-nucleotide variants by melting temperature," UT invention disclosure (UT TECH ID 6897).
2. (at UT) **H.-C. Yeh**, *J.M. Obliosca*, *Y.-A. Chen, C. Liu, Y.-L. Liu*, "Metal nanocluster beacons for detection of epigenetic modifications," U.S. patent pending (U.S. 15/231,262). Filed 7 Aug 2015.
3. (at UT) A. Dunn, **H.-C. Yeh**, and *E.P. Perillo*, "Systems and methods for particle tracking using spatiotemporal offset light beams," PCT patent pending (WO/2016/126250). Filed 2 May 2015.
4. **H.-C. Yeh**, J. Sharma, J.S. Martinez, and J.H. Werner, "Compositions and methods for detecting single nucleotide polymorphisms," U.S. patent 9,499,866 (8 Dec 2016).
5. **H.-C. Yeh**, J. Sharma, J.S. Martinez, and J.H. Werner, "Probe and method for DNA detection," U.S. patent 8,476,014 (22 Feb 2011).
6. J. Gritters, C.A. Bang, E. Klaasssen, L. Fan, R. Chen, **H.-C. Yeh**, and E.J.J. Kruglick, "MEMS device with two axes comb drive actuators," U.S. patent 7,872,394 B1 (18 Jan 2011).
7. **H.-C. Yeh** and S. Patra, "Indium plated package for an optical component and process therefore," U.S. patent 6,567,604 (23 May 2003)

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES:

- American Society for Engineering Education (ASEE), since 2017
- Biophysical Society (BPS), since 2008
- Biomedical Engineering Society (BMES), since 2006
- Institute of Electrical and Electronics Engineers (IEEE), since 1998
- Society of Photographic Instrumentation Engineers (SPIE), since 2010

- American Society of Mechanical Engineers (ASME), since 2014
- American Chemical Society (ACS), since 2016

UNIVERSITY COMMITTEE ASSIGNMENTS:

Departmental-	Member, Award committee	2013-present
	Member, Faculty search committee	2013-2014
	Member, Graduate study committee executive	2015-present
	Member, Seminar committee	2015-present
	Chair, International graduate admission committee	2015
	Member, International graduate admission committee	2016-present
School-	Cockrell School of Engineering ad hoc math curriculum	2017-present
	Cockrell School of Engineering ad hoc math curriculum	2013-2014
University-		

PROFESSIONAL SOCIETY AND MAJOR GOVERNMENTAL COMMITTEES:

Professional Society/Conference Organization:

1. Session organizing chair and technical program committee, IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2017): Emerging Micro- and Nano-Scale Sensing and Manipulation Techniques (4/10/2017).
2. Session chair, IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2017): Nanomaterials II (4/11/2017).
3. Session organizing chair and technical program committee, IEEE International Conference on Nano/Molecular Medicine & Engineering (IEEE-NANOMED 2015): Detection, Delivery and Microscopy in Single Cells (11/17/2015).
4. Session chair, IEEE International Conference on Nano/Molecular Medicine & Engineering (IEEE-NANOMED 2015): Innovative Optical Sensing Technologies for Biomedical Diagnosis (11/17/2015).
5. Session chair, Biomedical Engineering Society Conference (BMES 2015): Optical Imaging III: Microscopy Advances (10/10/2015).

Review Committees:

1. National Science Foundation, ECCS Division, Grant Review Committee for CCSS program (3/4-3/5/2013).
2. Journal Peer Review: *Nature Methods, Nature Communications, Light: Science & Applications, Analytical Chemistry, Chemical Communications, ACS Nano, Lab on a Chip, Biosensors and Bioelectronics, Nanoscale, Journal of Materials Chemistry B, ACS Applied Materials & Interfaces, Journal of Colloid & Interface Science, Nano LIFE.*

PUBLICATIONS:

Bold publications counted in rank

A. Refereed Archival Journal Publications

1. **H.-C. Yeh**, Y.-P. Ho, and T.-H. Wang, "Quantum dot–mediated biosensing assays for specific nucleic acid detection," *Nanomedicine: Nanotechnology, Biology and Medicine* 1(2): 115-121, 2005.
2. **H.-C. Yeh**, S.-Y. Chao, Y.-P. Ho, and T.-H. Wang, "Single-molecule detection and probe strategies for rapid and ultrasensitive genomic detection," *Current Pharmaceutical Biotechnology* 6(6): 453-461, 2005.

3. Zhang, **H.-C. Yeh**, M. Kuroki, and T.-H. Wang, "Single-quantum-dot-based DNA nanosensor," *Nature Materials* 4(11): 826-831, 2005.
4. **H.-C. Yeh**, Y.-P. Ho, I.-M. Shih, and T.-H. Wang, "Homogeneous point mutation detection by quantum dot-mediated two-color fluorescence coincidence analysis," *Nucleic Acids Research* 34(5): e35, 2006.
5. **H.-C. Yeh**, C. Puleo, T.C. Lim, Y.-P. Ho, P. Giza, R.-C. Huang, and T.-H. Wang. "A microfluidic-FCS platform for investigation on the dissociation of Sp1-DNA complex by doxorubicin," *Nucleic Acids Research* 34(21): e144, 2006.
6. Puleo, **H.-C. Yeh,** and T.-H. Wang, "Applications of MEMS technologies in tissue engineering," *Tissue Engineering* 13(12): 2839-2854, 2007.
7. Y. Joo, **H.-C. Yeh**, K. Dieu, and C.-J Kim, "Air cooling of a microelectronic chip with diverging metal microchannels monolithically processed using a single mask," *Journal of Micromechanics and Microengineering* 18(11): 115022, 2008.
8. Puleo, **H.-C. Yeh**, K. Liu, and T.-H. Wang, "Coupling confocal fluorescence detection and recirculating microfluidic control for single particle analysis in discrete nanoliter volumes," *Lab on a Chip* 8: 822-825, 2008.
9. **H.-C. Yeh**, C. Puleo, Y.-P. Ho, V. Bailey, T.C. Lim, K. Liu, and T.-H. Wang, "Tunable blinking kinetics of Cy5 for precise DNA quantification and single-nucleotide difference detection," *Biophysical Journal* 95(2): 729-737, 2008.
10. Y. Bao, **H.-C. Yeh**, C. Zhong, S.A. Ivanov, J. Sharma, M.L. Neidig, D.M. Vu, A.P. Shreve, R.B. Dyer, J.H. Werner, and J.S. Martinez, "Formation and stabilization of fluorescent gold nanoclusters using small molecules," *Journal of Physical Chemistry C* 114(38): 15879-15882, 2010.
11. **H.-C. Yeh***, J. Sharma* (*equal contribution), H. Yoo, J.H. Werner, and J.S. Martinez, "A complementary palette of fluorescent silver nanoclusters," *Chemical Communications* 46(19): 3280-3282, 2010.
12. **H.-C. Yeh**, J. Sharma, J.J. Han, J.S. Martinez, and J.H. Werner, "A DNA-silver nanocluster probe that fluoresces upon hybridization," *Nano Letters* 10(8): 3106-3110, 2010.
13. H. Yoo, J. Sharma, **H.-C. Yeh**, and J.S. Martinez, "Solution-phase synthesis of Au fibers using rod-shaped micelles as shape directing agents," *Chemical Communications* 46(36): 6813-6815, 2010.
14. J. Sharma, **H.-C. Yeh**, H. Yoo, J.H. Werner, and J.S. Martinez, "Silver nanocluster aptamers: in situ generation of intrinsically fluorescent recognition ligands for protein detection," *Chemical Communications* 47(8): 2294-2296, 2011.
15. **H.-C. Yeh**, J. Sharma, J.J. Han, J.S. Martinez, and J.H. Werner, "A beacon of light: a new molecular probe for homogeneous detection of nucleic acid targets," *IEEE Nanotechnology Magazine* 5(2): 28-33, 2011.
16. M.L. Neidig, J. Sharma, **H.-C. Yeh**, J.S. Martinez, S.D. Conradson, and A.P. Shreve, "Ag K-edge EXAFS of DNA-templated fluorescent silver nanoclusters: insight into the structural origins of emission tuning by DNA sequence variation," *Journal of the American Chemical Society* 133(31): 11837-11839, 2011.
17. J. Sharma, R.C. Rocha, M.L. Phipps, **H.-C. Yeh**, K.A. Balatsky, D.M. Vu, A.P. Shreve, J.H. Werner, and J.S. Martinez, "A DNA-templated fluorescent silver nanocluster with enhanced stability," *Nanoscale* 4: 4107-4110, 2012.
18. S.H. Yau, N. Abeyasinghe, M. Orr, L. Upton, O. Varnavski, J.H. Werner, **H.-C. Yeh**, J. Sharma, A.P. Shreve, J.S. Martinez, and T. Goodson III, "Bright two-photon emission and ultra-fast relaxation dynamics in a DNA-templated nanocluster investigated by ultra-fast spectroscopy," *Nanoscale* 4: 4247-4254, 2012.
19. **H.-C. Yeh**, J. Sharma, I.-M. Shih, D.M. Vu, J.S. Martinez, and J.H. Werner, "A fluorescence light-up Ag nanocluster probe that discriminates single-nucleotide variants by emission color," *Journal of the American Chemical Society* 134 (28): 11550-11558, 2012.

20. *J.M. Obliosca*, *C. Liu*, *R.A. Batson*, *M.C. Babin*, J.H. Werner, and H.-C. Yeh, "DNA/RNA detection using DNA-templated few-atom silver nanoclusters," *Biosensors* 3(2): 185-200, 2013.
21. *J.M. Obliosca*, *C. Liu*, and H.-C. Yeh, "Fluorescent silver nanoclusters as DNA probes," *Nanoscale* 5: 8443-8461, 2013.
22. J.*M. Obliosca*, *M.C. Babin*, *C. Liu*, *Y.-L. Liu*, *Y.-A. Chen*, *R.A. Batson*, M. Ganguly, J.T. Petty, and H.-C. Yeh, "A complementary palette of NanoCluster Beacons," *ACS Nano* 8(10): 10150-10160, 2014.
23. S. Juul, *J.M. Obliosca*, *C. Liu*, *Y.-L. Liu*, *Y.-A. Chen*, *D.M. Imphean*, B. R. Knudsen, Y.-P. Ho, K.W. Leong, and H.-C. Yeh, "NanoCluster Beacons as reporter probes in rolling circle enhanced enzyme activity detection," *Nanoscale* 7: 8332-8337, 2015.
24. *E.P. Perillo*, *Y.-L. Liu*, K. Huynh, *C. Liu*, C.-K. Chou, M.-C. Hung, H.-C. Yeh*, and A. Dunn* (co-corresponding authors) "Deep and high-resolution three-dimensional tracking of single particles using nonlinear and multiplexed illumination," *Nature Communications* 6, 7874, 2015.
25. *Y.-A. Chen*, *J.M. Obliosca*, *Y.-L. Liu*, *C. Liu*, *M.L. Gwozdz*, and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N6-methyladenine," *Journal of the American Chemical Society* 137(33): 10476-10479, 2015.
26. *C. Liu*, *Y.-L. Liu*, *E.P. Perillo*, A.K. Dunn and H.-C. Yeh, "Improving z-tracking accuracy in the two-photon single-particle tracking microscope," *Applied Physics Letters* 107, 153701, 2015.
27. *E.P. Perillo*, J.E. McCracken, D.C. Fernée, J.R. Goldak, F.A. Medina, D.R. Miller, H.-C. Yeh, and A.K. Dunn, "Deep in vivo two-photon microscopy with a low cost custom built mode-locked 1060 nm fiber laser," *Biomedical Optics Express* 7(2): 324-334, 2016.
28. *C. Liu*, *Y.-L. Liu*, *E.P. Perillo*, A.K. Dunn and H.-C. Yeh, "Single-molecule tracking and its application in biomolecular detection," *IEEE Journal of Selected Topics in Quantum Electronics* 22(4): 6804013, 2016.
29. *Y.-L. Liu*, *E.P. Perillo*, *C. Liu*, *P. Yu*, C.-K. Chou, M.-C. Hung, A.K. Dunn and H.-C. Yeh, " Segmentation analysis for trajectories acquired by the TSUNAMI tracking microscope: An application to EGFR trafficking," *Biophysical Journal* 111(10): 2214-2227, 2016.
30. *C. Liu*, *J.M. Obliosca*, *Y.-L. Liu*, *Y.-A. Chen*, N. Jiang and H.-C. Yeh, "3D single-molecule tracking enables direct hybridization kinetics measurement in solution," *Nanoscale* 9: 5664-5670, 2017.
31. *C. Liu*, *A. Rastogi* and H.-C. Yeh, "Quantification of rare single-molecule species based on fluorescence lifetime," *Analytical Chemistry* 89(9): 4772-4775, 2017.
32. *J.M. Obliosca*, S.Y. Cheng, *Y.-A. Chen*, M.F. Llanos, *Y.-L. Liu*, *D.M. Imphean*, D. Bell, J.T. Petty, P. Ren and H.-C. Yeh, "LNA thymidine monomer enables differentiation of the four single-nucleotide variants by melting temperature," *JACS* 139(20): 7110-7116, 2017.
33. *E.P. Perillo*, J.W. Jarrett, *Y.-L. Liu*, A. Hassan, D.C. Fernée, J.R. Goldak, A. Bonteanu, D.J. Spence, H.-C. Yeh and A.K. Dunn, "Two-color multiphoton in vivo imaging with a femtosecond diamond Raman laser," *Light: Sciences & Applications* 6, e17095, 2017.
34. V. Le, J. Lee, S. Chaterji, A. Spencer, *Y.-L. Liu*, P. Kim, H.-C. Yeh, D.-H. Kim and A.B. Baker, "Syndecan-1 in mechanosensing of nanotopological cues in engineered materials," under review, submitted 8 Aug, 2016.
35. C.-W. Li, S.-O. Lim, E.M. Chung, Y.-S. Kim, A.H. Park, J.-H. Cha, W. Xia, L.-C. Chan, T. Kim, S.-S. Chang, H.-H. Lee, C.-K. Chou, *Y.-L. Liu*, H.-C. Yeh, *E.P. Perillo*, A.K. Dunn, C.-W. Kuo, K.-H. Khoo, J.L. Hsu, Y. Wu, J.-M. Hsu, H. Yamaguchi, J. Yao, A.A. Sahin, G.N. Hortobagyi, S.S. Yoo and M.-C. Hung, "Targeting glycosylated PD-L1 with an antibody-drug conjugate," under review, submitted 8 May, 2017.

B. Refereed Conference Proceedings

1. L. Fan, S. Gloeckner, P.D. Dobblelaere, S. Patra, D. Reiley, C. King, **T. Yeh**, J. Gritters, S. Gutierrez, Y. Loke, M. Harburn, R. Chen, E. Kruglick, A. Husain, M. Wu, "Digital MEMS switch for planar photonic crossconnects," *Optical Fiber Communication Conference* (OFC 2002), Anaheim, CA, Mar 17, 2002. Proc. TuO4, 2002.
2. R. Chen, **T. Yeh**, M. Chu, P.D. Dobbeleere, J. Gritters, L. Fan, and E. Kruglick, "Design and analysis of a MEMS based 1: N monitored protection switch," *European Conference on Optical Communication* (ECOC 2002), Copenhagen, Denmark, Sep 8-12, 2002. Proc. 1-2, 2002.
3. **H.-C. Yeh**, E. Simone, C. Zhang, and T.-H. Wang, "Single bio-molecule detection with quantum dots in a microchannel," *IEEE International Conference on Micro Electro Mechanical Systems* (IEEE-MEMS 2004), Maastricht, Netherlands, Jan 25-29, 2004. Proc. 371-374, 2004.
4. **H.-C. Yeh**, Y.-P. Ho, and T.-H. Wang, "Quantum dot-mediated separation-free assay for point mutation detection," *NSTI Nanotechnology Conference and Trade Show* (NSTI Nanotech 2005), Anaheim, CA, May 8-12, 2005. Proc. 198-201, 2005.
5. **H.-C. Yeh**, C. Puleo, Y.-P. Ho and T.-H. Wang, "Towards single-molecule diagnostics using microfluidic manipulation and quantum dot nanosensors," *International Conference on Nanochannels, Microchannels and Minichannels* (ICNMM 2007), Puebla, Mexico, Jun 18-20, 2007. Proc. 1133-1140, 2007.
6. Y.-P. Ho, H. Chen, C. Puleo, **H.-C. Yeh**, K. Leong and T.-H. Wang, "Quantitative kinetic analysis of DNA nanocomplex self-assembly with quantum dots FRET in a microfluidic device," *IEEE International Conference on Micro Electro Mechanical Systems* (MEMS 2008), Tucson, USA, Jan. 13-17, 2008. Proc. 30-33, 2008.
7. C.M. Puleo, **H.-C. Yeh**, K.J. Liu, T. Rane, T.-H. Wang, "Coupling evaporation-based, microfluidic concentration and confocal fluorescence spectroscopy," *IEEE International Conference on Micro Electro Mechanical Systems* (MEMS 2008), Tucson, USA, Jan. 13-17, 2008. Proc. 200-203, 2008.
8. V.J. Bailey, C.M. Puleo, Y.-P. Ho, H.-C. Yeh, and T.-H. Wang, "Quantum dots in molecular detection of disease," *IEEE International Conference on Engineering in Medicine and Biology Society* (IEEE-EMBC 2009), Minneapolis, MN, Sep 3-6, 2009. Proc. 4089-4092, 2009.
9. **H.-C. Yeh**, J. Sharma, J.J. Han, J.S. Martinez and J.H. Werner, "NanoCluster Beacon – a new molecular probe for homogeneous detection of nucleic acid targets," *IEEE International Conference on Nano/Micro Engineered and Molecular Systems* (IEEE-NEMS 2011), Kaohsiung, Taiwan, Feb 20-23, 2011. Proc. 267-270, 2011.
10. **H.-C. Yeh**, J. Sharma, H. Yoo, J.S. Martinez and J.H. Werner, "Photophysical characterization of fluorescent metal nanoclusters synthesized using oligonucleotides, proteins and small molecule ligands," *BiOS, SPIE Photonics West*, San Francisco, CA, Jan 23-28, 2010. Proc. SPIE 7576: 75760N, 2010.
11. ***C. Liu, Q. Zhuang*, and H.-C. Yeh, "Three dimensional single-molecule tracking with confocal-feedback microscope," *IEEE International Conference on Nano/Micro Engineered and Molecular Systems* (IEEE-NEMS 2014), Waikiki Beach, HI, Apr 13-16, 2014. Proc. 481-484, 2014.**
12. ***C. Liu, E.P. Perillo, Q. Zhuang*, K.T. Huynh, A.K. Dunn, and H.-C. Yeh, "3D single-molecule tracking using one- and two-photon excitation microscopy," *BiOS, SPIE Photonics West*, San Francisco, CA, Feb 1-6, 2014. *Proc. SPIE* 89501C-9, 2014.**
13. ***E.P. Perillo*, L. De Haro, M.E. Phipps, J.S. Martinez, H.-C. Yeh, A.K. Dunn, D.P. Shepherd, and J.H. Werner, "Enhanced 3D localization of individual RNA transcripts via astigmatic imaging," *BiOS, SPIE Photonics West*, San Francisco, CA, Feb 4-6, 2014. *Proc. SPIE* 895003-11, 2014.**
14. ***E.P. Perillo, Y.-L. Liu, C. Liu*, H.-C. Yeh, and A.K. Dunn, "Single particle tracking through highly scattering media with multiplexed two-photon excitation," *BiOS, SPIE Photonics West*, San Francisco, CA, Feb 7-9, 2015. *Proc. SPIE* 933107, 2015.**

C. Other Major Publications

D. Books, Chapters of Books; Editor of Books (-clear designation of role if it is not author (e.g., editor, compiler, etc.)

Book Chapters

1. T.-H. Wang, C. Puleo and **H.-C. Yeh**, "Single molecule DNA detection," in "Integrated Biochips for DNA Analysis," edited by R. Liu and A. Lee, Landes Bioscience Publishers, 2007.
2. T.-H. Wang, K. Liu, **H.-C. Yeh** and C. Puleo, "Nanobiosensors," in "Micro/Nano Technology Systems for Biomedical Applications: Microfluidics, Optics, and Surface Chemistry," edited by C.-M. Ho, Oxford University Press, 2010. DOI:10.1093/acprof:oso/9780199219698.003.0010

E. Reviews

F. Technical Reports

ORAL PRESENTATIONS:

Conference presentations:

1. **H.-C. Yeh, J. Sharma, I.-M. Shih, D.M. Vu, J.S. Martinez, and J.H. Werner, "Chameleon NanoCluster Beacons: DNA-silver nanocluster probes that differentiate single-nucleotide polymorphisms by fluorescence color," *The Biomedical Engineering Society Annual Meeting* (BMES 2012), Atlanta, GA, Oct 24-27, 2012.**
2. **S. Juul, J.M. Obliosca, Y.-P. Ho, B. Knudsen, H.-C. Yeh, and K.W. Leong, "Microfluidics-based diagnosis-on-a-chip by enzyme activity detection," *The Biomedical Engineering Society Annual Meeting* (BMES 2013), Seattle, WA, Sep 25-28, 2013.**
3. **H.-C. Yeh, J.M. Obliosca, C. Liu, and Y.-L. Liu, "Engineering silver clusters for biosensing and molecular imaging," *ASME 3rd Global Congress on Nanoengineering for Medicine and Biology* (ASME-NEMB 2014), San Francisco, CA, Feb 2-5, 2014.**
4. **E.P. Perillo, L. De Haro, M.E. Phipps, J.S. Martinez, H.-C. Yeh, A.K. Dunn, D.P. Shepherd, and J.H. Werner, "Enhanced 3D localization of individual RNA transcripts via astigmatic imaging," *BiOS, SPIE Photonics West*, San Francisco, CA, Feb 4-6, 2014. *Proc. SPIE* 895003-11, 2014.**
5. **C. Liu, Q. Zhuang, and H.-C. Yeh, "Three dimensional single-molecule tracking with confocal-feedback microscope," *IEEE International Conference on Nano/Micro Engineered and Molecular Systems* (IEEE-NEMS 2014), Waikiki Beach, HI, Apr 13-16, 2014. Proc. 481-484, 2014.**
6. **E.P. Perillo, Y.-L. Liu, C. Liu, H.-C. Yeh, and A.K. Dunn, "Intracellular three-dimensional single-particle tracking with multiplexed-two-photon excitation," *The Biomedical Engineering Society Annual Meeting* (BMES 2014), San Antonio, TX, Oct 22-25, 2014.**
7. **D.M. Imphean, R.A. Batson, J.M. Obliosca, and H.-C. Yeh, "New chameleon NanoCluster Beacons for emission-spectrum-based SNP detection," *The Biomedical Engineering Society Annual Meeting* (BMES 2014), San Antonio, TX, Oct 22-25, 2014.**
8. **Y.-L. Liu, E.P. Perillo, C. Liu, A.K. Dunn, and H.-C. Yeh, "Multicolor three-dimensional tracking of single epidermal growth factor receptors," *The Biomedical Engineering Society Annual Meeting* (BMES 2014), San Antonio, TX, Oct 22-25, 2014.**
9. **C. Liu, Y.-L. Liu, E.P. Perillo, Q. Zhuang, and H.-C. Yeh, "Single-molecule tracking using different fluorescent labels," *The Biomedical Engineering Society Annual Meeting* (BMES 2014), San Antonio, TX, Oct 22-25, 2014.**
10. **J.M. Obliosca, M. Babin, C. Liu, Y.-L. Liu, R.A. Batson, and H.-C. Yeh, "New design strategies for multicolor NanoCluster Beacons," *The Biomedical Engineering Society Annual Meeting* (BMES 2014), San Antonio, TX, Oct 22-25, 2014.**
11. **H.-C. Yeh, "Silver cluster-based biosensing and advanced molecular tracking microscopes", *28th Annual Symposium, SCBA-Texas Chapter*, Houston, TX, Apr 19, 2014.**
12. **E.P. Perillo, Y.-L. Liu, C. Liu, H.-C. Yeh, and A.K. Dunn, "Single particle tracking through highly scattering media with multiplexed two-photon excitation," *BiOS, SPIE Photonics West*, San Francisco, CA, Feb 7-9, 2015. *Proc. SPIE* 933107, 2015.**

13. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons enable enzyme-free N^6-methyladenine detection," *The Biomedical Engineering Society Annual Meeting* (BMES 2015), Tampa, FL, Oct 7-10, 2015.
14. C. Liu, Y.-L. Liu, E.P. Perillo, A. Dunn and H.-C. Yeh, "Improving Z-tracking accuracy in TSUNAMI 3D tracking microscope," *The Biomedical Engineering Society Annual Meeting* (BMES 2015), Tampa, FL, Oct 7-10, 2015.
15. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, " Deep and high-resolution 3D tracking of single particles using nonlinear and multiplexed illumination (TSUNAMI)," *The 9th IEEE International Conference on Nano/Molecular Medicine and Engineering* (IEEE-Nanomed), Waikiki Beach, HI, Nov 15-18, 2015.
16. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N^6-methyladenine," *The 9th IEEE International Conference on Nano/Molecular Medicine and Engineering* (IEEE-Nanomed), Waikiki Beach, HI, Nov 15-18, 2015.
17. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, "Deep and high-resolution 3D tracking of single particles using nonlinear and multiplexed illumination (TSUNAMI)," *Materials Research Society Meeting* (MRS), Boston, MA, Nov 29-Dec 4, 2015.
18. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N^6-methyladenine," *Materials Research Society Meeting* (MRS), Boston, MA, Nov 29-Dec 4, 2015.
19. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, " Deep and high-resolution 3D tracking of single particles using nonlinear and multiplexed illumination (TSUNAMI)," *ASME NanoEngineering for Medicine and Biology Conference* (ASME/NEMB), Houston, TX, Feb 21-24, 2016.
20. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N^6-methyladenine," *ASME NanoEngineering for Medicine and Biology Conference* (ASME/NEMB), Houston, TX, Feb 21-24, 2016.
21. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons for detection of a single N^6-methyladenine epigenetic modification," *Biophysical Society 60th Annual Meeting*, Los Angeles, CA, Feb 27-Mar 2, 2016.
22. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, "Deep and high-resolution 3D tracking of single particles using nonlinear and multiplexed illumination (TSUNAMI)," *Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy* (Pittcon 2016), Atlanta, GA, Mar 6-10, 2016.
23. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N^6-methyladenine," *Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy* (Pittcon 2016), Atlanta, GA, Mar 6-10, 2016.
24. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, " Deep and high-resolution 3D tracking of single particles using nonlinear and multiplexed illumination (TSUNAMI)," *251st American Chemical Society National Meeting* (ACS), San Diego, CA, Mar 13-17, 2016.
25. J.M. Obliosca, Y.-A. Chen, C. Liu, Y.-L. Liu and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N^6-methyladenine," *251st American Chemical Society National Meeting* (ACS), San Diego, CA, Mar 13-17, 2016.
26. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, "Multicolor three-dimensional tracking of receptor tyrosine kinases," *252nd American Chemical Society National Meeting* (ACS), Philadelphia, PA, Aug 21-25, 2016.
27. H.-C. Yeh, "Few-atom silver cluster-based activatable probes for biosensing," *252nd American Chemical Society National Meeting* (ACS), Philadelphia, PA, Aug 21-25, 2016.
28. E.P. Perillo, Y.-L. Liu, C. Liu, A.K. Dunn and H.-C. Yeh, "Deep and high-resolution three-dimensional tracking of single particles using nonlinear and multiplexed illumination," *Quantitative BioImaging Conference* (QBI), College Station, TX, Jan 5-7, 2017.

29. J.M. Obliosca, S.Y. Cheng, Y.-A. Chen, M.F. Llanos, Y.-L. Liu, D.M. Imphean, D. Bell, J.T. Petty, P. Ren and H.-C. Yeh, "Locked nucleic acid thymine monomer probe identifies four single-nucleotide variants by melting temperature," *Biophysical Society 61st Annual Meeting*, New Orleans, LA, Feb 11-15, 2017.
30. C. Liu, J.M. Obliosca, Y.-L. Liu, Y.-A. Chen, N. Jiang and H.-C. Yeh, "Characterization of binding kinetics in solution using 3D single-molecule tracking techniques," *IEEE International Conference on Nano/Micro Engineered and Molecular Systems* (IEEE-NEMS 2017), Los Angeles, CA, Apr 9-12, 2017.
31. J.M. Obliosca, S.Y. Cheng, Y.-A. Chen, M.F. Llanos, Y.-L. Liu, D.M. Imphean, D. Bell, J.T. Petty, P. Ren and H.-C. Yeh, "LNA thymidine monomer enables differentiation of the four single-nucleotide variants by melting temperature," *XXVI International Materials Research Congress*, Cancun, Mexico, Aug 20-25, 2017.

Departmental or institutional seminars:

1. "A colorful tale of NanoCluster Beacons", Physics Division, Los Alamos National Laboratory, Los Alamos, NM, Dec 19, 2013.
2. "Silver cluster-based biosensing and advanced molecular tracking microscopes", Chemistry Department, Furman University, Greenville, SC, Mar 26, 2014.
3. "Silver cluster-based biosensing and advanced molecular tracking microscopes", iNANO Center, Aarhus University, Aarhus, Denmark, Jun 13, 2014.
4. "Silver cluster-based biosensing and advanced molecular tracking microscopes", Plant and Environmental Sciences Department, University of Copenhagen, Copenhagen, Denmark, Jun 16, 2014.
5. "Advanced molecular tracking microscopes and few-atom silver cluster-based biosensing", Graduate School of Biomedical Sciences, University of Texas Health Science Center San Antonio, San Antonio, TX, Apr 3, 2015.
6. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, University of California, Los Angeles, Los Angeles, CA, Jan 14, 2016.
7. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, Columbia University, New York City, NY, Jan 22, 2016.
8. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, University of Pennsylvania, Philadelphia, PA, Mar 1, 2016.
9. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, Pennsylvania State University, State College, PA, Mar 30, 2016.
10. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Pathology Department, Johns Hopkins University, Baltimore, MD, April 27, 2016.
11. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Chemistry Department, Oregon State University, Corvallis, OR, May 11, 2016.
12. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Mechanical Engineering Department, National Taiwan University, Taipei, TAIWAN, June 13, 2016.
13. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Engineering and System Science Department, National Tsing Hua University, Hsinchu, TAIWAN, June 14, 2016.
14. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Institute of Biomedical Engineering and Nanomedicine (IBEN), National Health Research Institutes (NHRI), Zhunan, TAIWAN, June 15, 2016.

15. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, TAIWAN, June 16, 2016.**
16. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, Rice University, Houston, TX, Aug 30, 2016.**
17. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Electrical and Computer Engineering Department, University of Minnesota, Twin Cities, Minneapolis, MN, Sep 8, 2016.**
18. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Chemistry and Biochemistry Department, University of Maryland Baltimore County, Baltimore, MD, Mar 3, 2017.**
19. **"TSUNAMI 3D tracking microscope and segmentation analysis of 3D trajectories of EGFR trafficking", Greehey Children's Cancer Research Institute, University of Texas Health Science Center at San Antonio, San Antonio, TX, May 5, 2017.**
20. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Electrical Engineering Department, National Taiwan University, Taipei, TAIWAN, Jun 8, 2017.**
21. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Materials Science and Engineering Department, National Cheng Kung University, Tainan, TAIWAN, Jun 13, 2017.**
22. **"Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Institute of NanoEngineering and MicroSystems, National Tsinghua University, Hsinchu, TAIWAN, Jun 23, 2017.**

GRANTS AND CONTRACTS:

Bold grants/contracts counted in rank

Co-PI	Title	Agency/Sponsor	Grant Total	Candidate Share	Grant Period
Andrew Dunn (MPI) Mien-Chie Hung (Co-I – MD Anderson)	**An integrated imaging tool for probing EGFR subcellular trafficking in real time**	**National Institutes of Health (Contact PI)**	**$430,000**	**$250,000**	**6/1/15-5/31/18**
Jeffrey Petty (Co-PI – Furman University)	**Engineering silver clusters for molecular measurement**	**National Science Foundation (Contact PI)**	**$550,000**	**$300,000**	**7/1/16-6/30/19**
Sole PI	**NanoCluster Beacons for highly specific DNA methylation detection**	**Welch Foundation**	**$375,000**	**$375,000**	**6/1/13-5/31/19**
Sole PI	**An integrated tool for probing receptor trafficking and signaling in cancer cells**	**Texas 4000**	**$25,000**	**$25,000**	**9/1/14-8/31/15**
Sole PI	**Molecular trajectory as a biomarker for early detection of castration resistance**	**Texas 4000**	**$25,000**	**$25,000**	**2/17/17-2/16/18**

Also include a table showing career total/career amount under candidate's supervision and "in rank" totals/"in rank" amount under candidate's supervision

Career Total	$1.405M
Career Candidate Share	$0.975M
In Rank Total	$1.405M
In Rank Candidate Share	$0.975M

PH.D. SUPERVISIONS COMPLETED:

Cong Liu	2017	BME		UT Austin	Single-molecule tracking and its application in biomolecular binding detection
Evan Perillo	2017	BME	Co-supervised with Andy Dunn	UT Austin	Nonlinear microscopy methods for imaging and particle tracking in thick biological specimen
Peng Chen	2014		Co-supervised with John Zhang	UT Austin	Multi-physical modeling and optimization of the immunomagnetic circulating tumor cells (CTCs) detection system

M.S. SUPERVISIONS COMPLETED:

N/A

PH.D. IN PROGRESS:

A. Students admitted to candidacy

Yen-Liang Liu, BME, 2013-present, proposed on 7/28/2016, expect to graduate in May 2018.

B. Post M.S. students preparing to take Ph.D. qualifying exam

Yuan-I Chen, BME, 2016-present, qualifying exam on 5/31/2017.

M.S. IN PROGRESS:

N/A

POSTDOCS:

1. Judy Obliosca, Ph.D., 11/12/2012-1/10/2017

OTHER ADVISING AND RELATED STUDENT SERVICE:

Student Service:

1. Judge for BME Design Competition (4/1/2017)
2. Judge for the poster session at the Graduate and Industry Networking (GAIN) event (1/29/2014, 1/31/2017)
3. Judge for the Cockrell School Poster Exhibition on Engineering Research (PEER) (4/19/2013, 4/9/2014, 4/21/2015)
4. Speaker for BME first-year interest group (FIG) (11/21/2016)
5. Speaker for professional development seminar for BME graduate students and postdocs (T32 program) (5/3/2016)
6. Speaker for Wolf Boy Scouts (Den 10, Pack 371) at Patsy Sommer Elementary School (9/20/2016)
7. Reviewer for Undergraduate Research Fellowship (URF) applications (2013-present)
8. Presenter at the STEAM Festival at Bastrop High School (1/23/2014)

9. Speaker at St. Dominic Savio Catholic High School (2/18/2014)
10. Panelist for discussion to promote STEM education at St. Dominic Savio Catholic High School (2/20/2014)
11. Speaker at Women Engineering Program (7/29/2014)
12. Presenter at Texas 4000 general meeting (4/20/2015)
13. Panelist in the SASE South Central Regional Conference (3/28/2015)
14. Speaker at UT Taiwanese Student Association (2/20/2015 and 2/18/2016)
15. Speaker at the UT Pan American student campus visiting event (4/5/2013)
16. Panelist at Graduate Engineering Council Career Panel (10/28/2015)
17. Faculty advisor for Biomedical Engineering Capstone Design Team – Team 17 in 2015 and Team 14 in 2016.

Dissertation committees:

1. Stephanie Steichen, BME, 2013-2016
2. Donald Robinson, Chemistry, 2014-2016
3. Avinash Gadok, BME, 2015-2017
4. Bharadwaj Muralidharan, ECE, 2014-
5. Wilton Snead, BME, 2015-
6. Hai Yan, ECE, 2016-2017
7. David Miller, BME, 2016-
8. Amey Puranik, ChE, 2012-2015
9. Christian Schrandt, BME, 2013-2015
10. Bin Yang, BME, 2014-2015
11. Brandon Slaughter, BME, 2013-2013
12. Youngkyu Lee, ECE, 2013-2014
13. Chun-Hsien Wu, BME, 2013-2014
14. Gauri Bhave, BME, 2014-2014
15. Xiaojia Mu, BME, 2014-2014

Visiting Scholar Supervising:

1. Yu-An Chen, M.S., 4/17-present

Undergraduate student supervising:

1. Austin Batson, BME, 9/12-5/14
2. Mark Babin, Chemistry, 1/13-8/14
3. Quincy Zhuang, BME, 2/14-5/15
4. Anthony Hsu, BME, 6/13-5/15
5. Ben Hoang, BME, 2/14-8/15
6. Mohammad Syed, BME, 1/15-5/15
7. Kevin Varghese, BME, 8/14-5/16
8. Peter Yu, BME, 2/14-5/16
9. Mary Gwozdz, BME, 6/15-5/16
10. Hannah Horng, U. of Maryland, 6/16-8/16
11. Darren Imphean, BME, 6/14-5/17
12. Ajay Rastogi, BME, 6/15-5/17
13. Sunny Kim, BME, 1/16-present
14. Rohan Vasisht, BME, 1/16-present
15. Karena Yu, BME, 1/16-present
16. Sahana Krishnan, ECE, 1/17-present

High school student supervising:

1. Daniel McGaffin, summer 2013
2. Brandon Lee, summer 2015
3. Eric Borrego, summer 2016, 2017
4. Ian Chiu, summer 2017

VITA:

Biography:
Dr. Yeh obtained his BS degree from National Taiwan University, MS degree from University of California, Los Angeles, and PhD degree from Johns Hopkins University, all in mechanical engineering. After graduation from UCLA, he worked at Optical Micro Machines Inc. in San Diego from 98-03 as an R&D engineer, developing MEMS-based photonic switches for telecommunications. At Johns Hopkins, his research focused on single-molecule spectroscopy, BioMEMS and new biosensing techniques based on fluorescence dynamics. Dr. Yeh received his postdoctoral training at Los Alamos National Laboratory from 09-12, in the Center for Integrated Nanotechnologies. At LANL, he discovered controlled activation and color-switching phenomena on DNA-templated silver nanoclusters. Based on these findings, he and co-workers invented NanoCluster Beacons, which won a 2011 R&D 100 Award and a 2013 Postdoctoral Publication Prize in Experimental Sciences at LANL. Dr. Yeh joined the Biomedical Engineering Department at the University of Texas at Austin in 2012 as an assistant professor. His research interests include nanobiosensor development, cancer biomarker detection, 3D molecular tracking and super-resolution imaging. In 2016 he received an outstanding faculty award for BME from the Cockrell School of Engineering and the Student Engineering Council.

Research Statement:
Our research focuses on creating and studying new nanomaterials that have the potential to be used as future molecular probes (i.e. nanobiosensors) with unprecedented sensing capabilities, and developing new imaging tools for fundamental biomedical research at the single-molecule, single-cell level. Although we are in the post-genome era, we still face many unsolved questions in functional genomics and cellular signaling network. This is mainly due to the fact that we are ill-equipped with research tools to elucidate the sophisticated genetic processing and signaling mechanisms that are often obscured by cellular heterogeneity and the stochastic nature of molecular processes. Among all the tools that are currently being developed, it is increasingly evident that probes with superior specificity and sensitivity and instruments with single-molecule addressing capability are critical to characterize and understand this inherent variability in complex biological systems. Nanotechnology and single-molecule detection hold great promise for future quantitative biology. Along these lines, we have recently turned noble metal nanoclusters into low-cost, multicolor, and activatable probes that can be used for nucleic acid methylation detection, enzyme activity detection, and single-nucleotide polymorphism detection. We have achieved the results that no other molecular probes can achieve, which highlight the great potential of fluorescent nanomaterials in biomedical applications. In addition, we have built two state-of-the-art 3D single-molecular tracking microscopes to investigate the internalization, transport and signaling dynamics of membrane receptors, viral capsids and drug particles in live monolayer cell cultures and in cancer spheroids. Molecular trafficking within engineered 3D multicellular models is critical to the understanding of the development and treatment of various diseases including cancer. The mission of our group is to advance the molecular tracking techniques and use the enabling tools to solve issues in disease diagnosis and treatment.

Candidate's Summary of Activities

(in rank for assistant professor; since last promotion for associate professors)

Hsin-Chih "Tim" Yeh

Metric	Value
Peer-reviewed journal publications (in rank and total)	14 / 33
Peer-reviewed conference proceedings (in rank and total)	4 / 14
Number of journal papers in rank with supervised student(s) from UT as co-author	14
Total citations of all publications (career) from ISI Web of Knowledge	1886
h-index (career) from ISI Web of Knowledge	16
Total citations of all publications (career) from Google Scholar or Publish or Perish	2603
h-index (career) from Google Scholar or Publish or Perish	20
Total external research funding raised in rank	$1.405M
Total external research funding raised in rank (candidate's share)	$0.975M
Total number of external grants/contracts awarded in rank	5
Number of external grants/contracts awarded in rank as PI	5
PhD students completed†	2
MS students completed†	0
PhD students in pipeline (as of 09/2017) †	2
MS students in pipeline (as of 09/2017) †	0
Number of courses taught	9
Total number of students taught in organized courses	410
Average instructor evaluation for UG courses	4.38
Average instructor evaluation for Grad courses	4.6
Average course evaluation for UG courses	3.85
Average course evaluation for Grad courses	4.4
Number of teaching awards	1
Student organizations advised	2 (TCACF and TSA)
Undergraduate researchers supervised	20
Service on journal editorial boards	0
Number of symposia organized	5

† Count a student as 1.0 if sole supervisor and 0.5 if co-supervised.

Complete reverse chronological list of publications and scholarly/creative works

Hsin-Chih (Tim) Yeh

Title of Dissertation: Development of new bioanalysis techniques based on confocal fluorescence spectroscopy and nanotechnology for nucleic acid research
Dissertation Advisor: Jeff Wang, Johns Hopkins University

Section 1. Works published (or in an equivalent status), in press, accepted, or under contract while in current rank at UT Austin.

1. Perillo, Evan P., Jarrett, Jeremy W., Liu, Yen-Liang, Hassan, Ahmed, Fernée, Daniel C., Goldak, John R., Bonteanu, Andrei, Spence, David J., Yeh, Hsin-Chih, Dunn, Andrew K., "Two-color multiphoton in vivo imaging with a femtosecond diamond Raman laser," *Light: Sciences & Applications*, 2017, 6, e17095.
   - Co-authors: Evan Perillo was a co-advised graduate student between my laboratory and Andy Dunn's laboratory; Jeremy Jarrett is a postdoc in Andy Dunn's laboratory; Yen-Ling Liu is a graduate student in my laboratory; Ahmed Hassan is a graduate student in Andy Dunn's laboratory; Daniel Fernée, John Goldak, Andrei Bonteanu, and David Spence were undergraduate students in Andy Dunn's laboratory; Andy Dunn is a professor at UT Austin.
   - Qualitative statement of contribution: I co-advised the first author on the experiment designs, contributed to the imaging analysis, and participated in manuscript revision.

2. Obliosca, Judy M., Cheng, Sara Y., Chen, Yu-An, Llanos, Mariana F., Liu, Yen-Liang, Imphean, Darren M., Bell, David R., Petty, Jeffrey T., Ren, Pengyu, Yeh, Hsin-Chih, "LNA thymidine monomer enables differentiation of the four single-nucleotide variants by melting temperature," *Journal of American Chemical Society*, 2017, 139(20), 7110-7116.
   - Co-authors: Judy Obliosca was a postdoc in my laboratory; Sara Cheng is a graduate student in Pengyu Ren's laboratory; Yu-An Chen was a visiting scholar in my laboratory; Mariana Llanos was an undergraduate student in Jeffrey Petty's laboratory; Yen-Liang Liu is a graduate student in my laboratory; Darren Imphean was an undergraduate student in my laboratory; David Bell was a postdoc in Pengyu Ren's laboratory; Jeffrey Petty is a professor at Furman University; Penyu Ren is a professor at UT Austin.
   - Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

3. Liu, Cong, Obliosca, Judy M., Liu, Yen- Liang, Chen, Yu- An, Jiang, Ning, Yeh, Hsin-Chih, "3D single-molecule tracking enables direct hybridization kinetics measurement in solution", *Nanoscale*, 2017, 9, 5664.
   - Co-authors: Cong Liu was a graduate student in my laboratory; Judy Obliosca was a postdoc in my laboratory; Yen-Liang Liu is a graduate student in my laboratory; Yu-An Chen was a visiting scholar in my laboratory; Ning Jiang is an assistant professor at UT Austin.
   - Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the

theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

4. Liu, Cong, Rastogi, Ajay, Yeh, Hsin-Chih, "Quantification of rare single-molecule species based on fluorescence lifetime", *Analytical Chemistry*, 2017, 89(9), 4772-4775.
   - Co-authors: Cong Liu was a graduate student in my laboratory; Ajay Rastogi was an undergraduate student in my laboratory.
   - Qualitative statement of contribution: I designed the study, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

5. Liu, Yen-Liang, Perillo, Evan P., Liu, Cong, Yu, Peter, Chou, Chao-Kai, Hung, Mien-Chie, Dunn, Andrew K., Yeh, Hsin-Chih, "Segmentation of 3D trajectories acquired by TSUNAMI microscope: an application to EGFR trafficking," *Biophysical Journal*, 2016, 111(10), 2214-2227.
   - Co-authors: Yen-Liang Liu is a graduate student in my laboratory; Evan Perillo was a co-advised graduate student between my laboratory and Andy Dunn's Laboratory; Cong Liu was a graduate student in my laboratory; Peter Yu was an undergraduate student in my laboratory; Chao-Kai Chou is a research assistant professor in Mien-Chie Hung's laboratory; Mien-Chie Hung is a professor at UT MD Anderson Cancer Center; Andy Dunn is a professor at UT Austin.
   - Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

6. Liu, Cong, Liu, Yen-Liang, Perillo, Evan P., Dunn, Andrew K., Yeh, Hsin-Chih, "Single-molecule tracking and its application in biomolecular detection," *IEEE Journal of Selected Topics in Quantum Electronics*, 2016, 22(4), 6804013.
   - Co-authors: Cong Liu was a graduate student in my laboratory; Yen-Liang Liu is a graduate student in my laboratory; Evan Perillo was a co-advised graduate student between my laboratory and Andy Dunn's Laboratory. Andy Dunn is a professor at UT Austin.
   - Qualitative statement of contribution: I initiated manuscript drafting and revision.

7. Perillo, Evan P., McCracken, Justin E., Fernée, Daniel C., Goldak, John R., Medina, Flor A., Miller, David R., Yeh, Hsin-Chih, Dunn, Andrew K., "Deep in vivo two-photon microscopy with a low cost custom built mode-locked 1060 nm fiber laser," *Biomedical Optics Express*, 2016, 7(2), 324-334.
   - Co-authors: Evan Perillo was a co-advised graduate student between my laboratory and Andy Dunn's Laboratory; Justin McCracken, Daniel Fernée, and John Goldak were undergraduate students in Andy Dunn's laboratory; Flor Medina was a postdoc in Andy Dunn's laboratory; David Miller is a graduate student in Andy Dunn's Laboratory; Andy Dunn is a professor at UT Austin.
   - Qualitative statement of contribution: I co-advised the first author on the experiment designs, contributed to the imaging analysis, and participated in manuscript revision.

8. Liu, Cong, Liu, Yen-Liang, Perillo, Evan P., Jiang, Ning, Dunn, Andrew K., Yeh, Hsin-Chih, "Improving z-tracking accuracy in the two-photon single-particle tracking microscope," *Applied Physics Letters*, 2015, 107, 153701.

- Co-authors: Cong Liu was a graduate student in my laboratory; Yen-Liang Liu is a graduate student in my laboratory; Evan Perillo was a co-advised graduate student between my laboratory and Andy Dunn's Laboratory; Ning Jiang is an assistant professor at UT Austin; Andy Dunn is a professor at UT Austin.
- Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

9. Chen, Yu-An, Obliosca, Judy M., Liu, Yen-Liang, Liu, Cong, Gwozdz, Mary L., Yeh, Hsin-Chih, "NanoCluster Beacons enable detection of a single N6-methyladenine," *Journal of the American Chemical Society*, 2015, 137(33), 10476-10479.
   - Co-authors: Yu-An Chen was a visiting scholar in my laboratory; Judy Obliosca was a postdoc in my laboratory; Yen-Liang Liu is a graduate student in my laboratory; Cong Liu was a graduate student in my laboratory; Mary Gwozdz was an undergraduate student in my laboratory.
   - Qualitative statement of contribution: I designed the study, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

10. Perillo, Evan P., Liu, Yen-Liang, Huynh, Khang, Liu, Cong, Chou, Chao-Kai, Hung, Mien-Chie, Yeh Hsin-Chih*, Dunn, Andrew K.* (co-corresponding authors) "Deep and high-resolution three-dimensional tracking of single particles using nonlinear and multiplexed illumination," *Nature Communications*, 2015, 6, 7874.
    - Co-authors: Evan Perillo was a co-advised graduate student between my laboratory and Andy Dunn's Laboratory; Yen-Liang Liu is a graduate student in my laboratory; Khang Huynh was an undergraduate student in Andy Dunn's laboratory; Cong Liu was a graduate student in my laboratory; Chao-Kai Chou is a research assistant professor in Mien-Chie Hung's laboratory; Mien-Chie Hung is a professor at UT MD Anderson Cancer Center; Andy Dunn is a professor at UT Austin.
    - Qualitative statement of contribution: I designed the study together with the co-corresponding author, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

11. Juul, Sissel, Obliosca, Judy M., Liu, Cong, Liu, Yen-Liang, Chen, Yu-An, Imphean, Darren M., Knudsen, Birgitta R., Ho, Yi-Ping, Leong, Kam W., Yeh, Hsin-Chih, "NanoCluster Beacons as reporter probes in rolling circle enhanced enzyme activity detection," *Nanoscale*, 2015, 7, 8332-8337.
    - Co-authors: Sissel Juul was a co-advised postdoc between Birgitta Knudsen's laboratory and Kam Leong's laboratory; Judy Obliosca was a postdoc in my laboratory; Cong Liu was a graduate student in my laboratory; Yen-Liang Liu is a graduate student in my laboratory; Yu-An Chen was a visiting scholar in my laboratory; Darren Imphean was an undergraduate student in my laboratory; Birgitta Knudsen is a professor at Aarhus University in Denmark; Yi-Ping Ho was an assistant professor at Arhus University in Denmark; Kam Leong was a professor at Duke University.
    - Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the

theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

12. Perillo, Evan P., Liu, Yen-Liang, Liu, Cong, Yeh, Hsin-Chih, Dunn, Andrew K., "Single particle tracking through highly scattering media with multiplexed two-photon excitation," *SPIE Proceedings*, 2015, 933107.
    - Co-authors: Evan Perillo was a co-advisor graduate student between my laboratory and Andy Dunn's laboratory; Yen-Ling Liu is a graduate student in my laboratory; Cong Liu was a graduate student in my laboratory; Andy Dunn is a professor at UT Austin.
    - Qualitative statement of contribution: I designed the study together with the co-corresponding author, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

13. Obliosca, Judy M., Babin, Mark C., Liu, Cong, Liu, Yen-Liang, Chen, Yu-An, Batson, Robert A., Ganguly, Mainak, Petty, Jeffrey T., Yeh, Hsin-Chih, "A complementary palette of NanoCluster Beacons," *ACS Nano*, 2014, 8(10), 10150-10160.
    - Co-authors: Judy Obliosca was a postdoc in my laboratory; Mark Babin was an undergraduate student in my laboratory; Cong Liu was a graduate student in my laboratory; Yen-Liang Liu is a graduate student in my laboratory; Yu-An Chen was a visiting scholar in my laboratory; Robert Batson was an undergraduate student in my laboratory; Mainak Ganguly was a postdoc in Jeffrey Petty's laboratory; Jeffrey Petty is a professor at Furman University.
    - Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

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    - Co-authors: Cong Liu was a graduate student in my laboratory; Evan Perillo was a co-advisor graduate student between my laboratory and Andy Dunn's laboratory; Quincy Zhuang was an undergraduate student in my laboratory; Khang Huynh was an undergraduate student in Andy Dunn's laboratory; Andy Dunn is a professor at UT Austin.
    - Qualitative statement of contribution: I designed the study, established all collaborations, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

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    - Co-authors: Cong Liu was a graduate student in my laboratory; Quincy Zhuang was an undergraduate student in my laboratory.
    - Qualitative statement of contribution: I designed the study, supervised the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting.

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    - Co-authors: Evan Perillo was a co-advisor graduate student between my laboratory and Andy Dunn's laboratory; Leyma De Haro was a postdoc in Jennifer Martinez's laboratory; Mary Phipps is a technician in Jennifer Martinez's laboratory; Jennifer Martinez is a staff scientist at Los Alamos National Lab. Andy Dunn is a professor at UT Austin; Douglas Shepherd was a postdoc in James Werner's laboratory; James Werner is a staff scientist at Los Alamos National Laboratory.
    - Qualitative statement of contribution: I co-advised the first author and participated in manuscript discussion.

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    - Qualitative statement of contribution: I initiated manuscript drafting and revision.

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    - Co-authors: Judy Obliosca was a postdoc in my laboratory; Cong Liu was a graduate student in my laboratory; Robert Batson and Mark Babin were both undergraduate students in my laboratory; James Werner is a staff scientist at Los Alamos National Laboratory.
    - Qualitative statement of contribution: I initiated manuscript drafting and revision.

Section 2. Works published (or in equivalent status) while in current rank at other institutions (if applicable)

Not applicable.

Section 3. Works published (or in equivalent status) while in previous rank(s) at UT Austin (if applicable)

Not applicable.

Section 4. Works published (or in equivalent status) while in previous rank(s) at other institutions (if applicable)

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    - Co-authors: Jaswinder Sharma was a postdoc in Jennifer Martinez's laboratory; Ie-Ming Shih is a professor at Johns Hopkins University; Dung Vu, Jennifer Martinez and James Werner are all staff scientists at Los Alamos National Laboratory.

- Qualitative statement of contribution: I designed the study together with the co-corresponding author, established external collaborations, conducted the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

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    - Co-authors: Sung-Hei Yau, Neranga Abeyasinghe, Meghan Orr, and Leslie Upton were all graduate students in Theodore Goodson III's laboratory; James Werner is a staff scientist at Los Alamos National Laboratory; Jaswinder Sharma was a postdoc in Jennifer Martinez's laboratory; Andrew Shreve was a staff scientist at Los Alamos National Laboratory; Jennifer Martinez is a staff scientist at Los Alamos National Laboratory; Theodore Goodson III is a professor at University of Michigan.
    - Qualitative statement of contribution: I provided samples, participated in experiment designs, performed lifetime measurements, and contributed to the development of the theoretical framework and the interpretation of findings.

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    - Co-authors: Jaswinder Sharma was a postdoc in Jennifer Martinez's laboratory; Reginaldo Rocha is a staff scientist at Los Alamos National Laboratory; Mary Lisa is a technician in Jennifer Martinez's laboratory; Kirill Balatsky was an undergraduate student in Jennifer Martinez's laboratory; Dung Vu, Andrew Shreve, James Werner, and Jennifer Martinez are all staff scientists at Los Alamos National Laboratory.
    - Qualitative statement of contribution: I performed Figure 3 spectroscopic experiments and analyzed data. I contributed to the development of the theoretical framework and the interpretation of findings, and helped manuscript drafting and revision.

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    - Qualitative statement of contribution: I prepared samples for the K-Edge EXAFS experiments and contributed to manuscript drafting.

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- Qualitative statement of contribution: I performed Table 1 spectroscopic experiments and analyzed data. I contributed to the development of the theoretical framework and the interpretation of findings, and helped manuscript drafting and revision.

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    - Qualitative statement of contribution: I designed the study, conducted the experiments, conducted the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

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    - Co-authors: Jaswinder Sharma was a postdoc in Jennifer Martinez's laboratory; Jason Han was a postdoc in James Werner's laboratory; Jennifer Martinez and James Werner are both staff scientists at Los Alamos National Laboratory.
    - Qualitative statement of contribution: I designed the study, conducted the experiments, conducted the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

26. Sharma, Jaswinder*, Yeh, Hsin-Chih* (*equal contribution), Yoo, Hyojong, Werner, James H., Martinez, Jennifer S., "A complementary palette of fluorescent silver nanoclusters," *Chemical Communications*, 2010, 46(19), 3280-3282.
    - Co-authors: Jaswinder Sharma and Hyojong Yoo were both postdocs in Jennifer Martinez's laboratory; James Werner and Jennifer Martinez are both staff scientists at Los Alamos National Laboratory.
    - Qualitative statement of contribution: I performed the spectroscopic experiments, conducted the statistical analyses for the collected data, contributed to the development of the theoretical framework and the interpretation of findings, and initiated manuscript drafting and revision.

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    - Co-authors: Hyojong Yoo and Jaswinder Sharma were both postdocs in Jennifer Martinez's laboratory; Jennifer Martinez is a staff scientist at Los Alamos National Laboratory.
    - Qualitative statement of contribution: I contributed to the development of the theoretical framework and the interpretation of findings, and helped manuscript drafting and revision.

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- Co-authors: Yuping Bao was an assistant professor at University of Alabama; Chang Zhong was a postdoc in Sergei Ivanov's laboratory; Sergei Ivanov is a staff scientist at Los Alamos National Laboratory; Jaswinder Sharma was a postdoc in Jennifer Martinez's laboratory; Michael Neidig was a postdoc in Andrew Shreve's laboratory; Dung Vu and Andrew Shreve are both staff scientists at Los Alamos National Laboratory; Brian Dyer is a professor at Emory University; James Werner and Jennifer Martinez are both staff scientists at Los Alamos National Laboratory.
- Qualitative statement of contribution: I performed Figure 2 spectroscopic experiments and analyzed data. I contributed to the development of the theoretical framework and the interpretation of findings, and helped manuscript drafting and revision.

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    - Co-authors: Christopher Puleo, Yi-Ping Ho, and Vasudev Bailey were all graduate students in Tza-Huei Wang's laboratory; Teck Chuan Lim was an undergraduate student in Tza-Huei Wang's laboratory; Kelvin Liu was a graduate student in Tza-Huei Wang's laboratory; Tza-Huei Wang is a professor at Johns Hopkins University.
    - Qualitative statement of contribution: I designed and performed the experiments, conducted the statistical analyses for the collected data, interpreted findings, and initiated manuscript drafting.

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    - Co-authors: Christopher Puleo and Kelvin Liu were both graduate students in Tza-Huei Wang's laboratory; Tza-Huei Wang is a professor at Johns Hopkins University.
    - Qualitative statement of contribution: I contributed to the development of the theoretical framework and the interpretation of findings, and helped manuscript drafting and revision.

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    - Co-authors: Youngcheol Joo is a professor at Soonchunhyang University; Kiet Dieu was a graduate student in Chang-Jin Kim's laboratory; Chang-Jin Kim is a professor at UCLA.
    - Qualitative statement of contribution: I designed and performed the experiments, conducted the statistical analyses for the collected data, interpreted findings, and initiated manuscript drafting. This paper is my MS thesis.

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    - Qualitative statement of contribution: I contributed to manuscript drafting and revision.

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- Co-authors: Christopher Puleo was a graduate student in Tza-Huei Wang's laboratory; Teck Chuan Lim was an undergraduate student in Tza-Huei Wang's laboratory; Yi-Ping Ho was a graduate student in Tza-Huei Wang's laboratory; Paul Giza was a technician in Ru-Chih Huang's laboratory; Ru-Chih Huang and Tza-Huei Wang are both professors at Johns Hopkins University.
- Qualitative statement of contribution: I designed and performed the experiments, conducted the statistical analyses for the collected data, interpreted findings, and initiated manuscript drafting and revision.

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    - Co-authors: Yi-Ping Ho was a graduate student in Tza-Huei Wang's laboratory; Ie-Ming Shih and Tza-Huei Wang are both professors at Johns Hopkins University.
    - Qualitative statement of contribution: I designed and performed the experiments, conducted the statistical analyses for the collected data, interpreted findings, and initiated manuscript drafting and revision.

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    - Co-authors: Chun-Yang Zhang was a postdoc in Tza-Huei Wang's laboratory; Marcos Kuroki was an undergraduate student in Tza-Huei Wang's laboratory; Tza-Huei Wang is a professor at Johns Hopkins University.
    - Qualitative statement of contribution: I performed the Figure 3 lifetime measurements, contributed to the development of the theoretical framework and the interpretation of findings, and helped manuscript drafting and revision.

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    - Co-authors: Shu-Yi Chao and Yi-Ping Ho were both graduate students in Tza-Huei Wang's laboratory; Tza-Huei Wang is a professor at Johns Hopkins University.
    - Qualitative statement of contribution: I initiated manuscript drafting and revision.

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    - Co-authors: Yi-Ping Ho was a graduate student in Tza-Huei Wang's laboratory; Tza-Huei Wang is a professor at Johns Hopkins University.
    - Qualitative statement of contribution: I designed and performed the experiments, conducted the statistical analyses for the collected data, interpreted findings, and initiated manuscript drafting and revision.

COCKRELL SCHOOL OF ENGINEERING
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Department of Biomedical Engineering Budget Council Statement on Teaching

Candidate Name: Hsin-Chih (Tim) Yeh

Prepared by: Mia K. Markey

Preparer Signature:

1. Faculty member's principal areas of teaching

In rank as an Assistant Professor, Prof. Hsin-Chih (Tim) Yeh's teaching contributions were in the areas of numerical methods, nanotechnology, and optical techniques. At the undergraduate level, he taught BME 113L/313L Introduction to Numerical Methods in Biomedical Engineering and BME 354 Molecular Sensors and Nanodevices for Biomedical Applications. BME 113L/313L is required of all BME undergraduates and is typically taken in the spring of the sophomore year. BME 354 is an elective course, which attracts approximately 20-25 undergraduates per offering. Prof. Yeh also taught two graduate electives, BME 381J Fluorescence Microscopy and Spectroscopy and BME 385J Biomedical Micro- and Nanotechnology.

2. *Evaluation procedures and measures used*

The Budget Council's assessment of Prof. Yeh's teaching contributions is based upon: (a) review of a comprehensive teaching portfolio prepared by Prof. Yeh; (b) student feedback obtained through the Course Instructor Survey (CIS) administered for each course each semester; and (c) periodic peer evaluation by senior BME faculty that includes class observation.

3. *Student course/instructor and peer evaluations*

Prof. Yeh's CIS records clearly demonstrate that both undergraduate and graduate students respond well to his teaching style and recognize the educational value of his courses. His average instructor ratings are very positive for all types of courses – 4.1 for required undergraduate courses, 4.7 for elective undergraduate courses, and 4.6 for elective graduate courses. His average course ratings are likewise outstanding – 3.6 for required undergraduate courses, 4.1 for elective undergraduate courses, and 4.4 for elective graduate courses. Prof. Yeh's student evaluations for the required undergraduate course (BME 113L/313L) are particularly impressive given that they span the transition from it being counted as a 1-credit hour class to counted as a 3-credit hour class. As you can imagine, the students were not happy during the semesters that they felt that the course demands were substantially higher than the credited awarded. (*N.B.* Prof. Yeh deserves acknowledgement for correcting the credit assignment situation, but the fault with creating the problem lies with me (Markey) as the original developer of the BME 113L course.)

The narrative comments on the CIS emphasize Prof. Yeh's infectious enthusiasm for the course content and his sincere caring attitude towards his students. The negative CIS comments, aside from the aforementioned concerns about the credit level deserved for the numerical methods course

(BME 113L/313L), are predominately logistical mishaps that are correctable and common to most new instructors (e.g., trying to cover too much content.)

Examples of positive comments on CIS	*Examples of negative comments on CIS*
Dr. Yeh was always very enthusiastic during lectures. He made an effort to meet with as many students as he could during the semester to get to know everyone and give career advice.	A large time commitment for only one credit hour.
This class was difficult, but Dr. Yeh's enthusiasm for the subject made it a lot easier for me to get excited about and learn the material.	Lectures were hard to follow – slides had a lot of text and pictures.
He genuinely cares about our success. Great prof!	Course was interesting, but went too in-depth on way too many topics.
Dr. Yeh is definitely one of my favorite professors. He cares about whether his students learn and actively asks about ways to improve.	I think Dr. Yeh wanted to cover so much material that it was hard to gain a strong understanding of a few key concepts.

While in rank as an Assistant Professor, Prof. Yeh's teaching was observed four times for four different senior faculty in BME. Prof. Yeh's peer evaluations identified the same strengths as were apparent from the student evaluations, though his colleagues had less concerns about the difficulty or pace of the course topics. The faculty reviews of Prof. Yeh's teaching consistently noted his good rapport with students, passion for teaching, and enthusiasm for the subject matter. The most consistent issue noted for improvement in his peer evaluations was helping students remain on-task when faced with the temptation of electronics in the classroom, which is inherent to courses that benefit from in-class computer-based learning activities such as BME 113L/313L.

4. *Balance between undergraduate and graduate teaching*

In rank, Prof. Yeh taught undergraduate courses 6 times and graduate courses 3 times. Of the undergraduate courses, half were elective offerings and half were a course required for the BME BS degree. Prof. Yeh's student evaluation (CIS) and peer-evaluations clearly demonstrate that he is excited and skilled in teaching both undergraduate and graduate courses. His average CIS instructor rating for undergraduate courses is 4.4 and for graduate courses it is 4.6. Likewise, his average CIS course rating for undergraduate courses is 3.9 and for graduate courses it is 4.4.

5. *Evidence of merit or recognition for teaching excellence*

In 2016, Prof. Yeh was recognized with the Outstanding Faculty Award for the BME department from the Student Engineering Council. This award is particularly noteworthy because it is based solely on *students'* nominations and votes. Thus, this recognition demonstrates our students' high regard for Prof. Yeh.

6. Teaching portfolio

Prof. Yeh provided the Budget Council with a comprehensive teaching portfolio including a statement of his teaching philosophy, syllabi, lecture materials, assignments, and exams. Numerous strengths are apparent from his teaching portfolio. Prof. Yeh's course materials are visually appealing,

integrating text, equations, and images, and leveraging variation in color, size, and location. He regularly employs real-world examples, from biomedicine, the natural world, and everyday life. Prof. Yeh skillfully uses humor and references to popular culture to engage his students. His assessments encompass several modes of evaluation, including short-answer questions, open-ended essay questions, derivations, proofs, interpretation of graphs and other visual representations, and interpretation of code. Prof. Yeh's course materials are based on both classical references and recent research advances in his discipline. He humanizes scientists and engineers by presenting information about the people responsible for the discoveries and inventions discussed in his classes.

7. Faculty's willingness to teach courses having a strong student demand

Prof. Yeh's student evaluations (CIS) and peer-evaluations clearly demonstrate that he brings the same enthusiasm and commitment to larger, required courses as he does to smaller, elective courses. In particular, the typical enrollment in BME113L/313L, a sophomore level course required for the BME BS degree, is 80-100 undergraduate students and Prof. Yeh's average instructor rating for this course is 4.1.

8. Participation on graduate committees

Prof. Yeh actively contributes to the research education of graduate students. He has advised 3 BME doctoral students to the completion of their degree, 2 of which were co-advised. He is currently supervising 2 more BME doctoral students, neither of which is co-advised. In rank, Prof. Yeh has served on 14 additional dissertation committees for students in BME (9), ChE (1), Chemistry (1), and ECE (3).

9. Supervision of postdoctoral students

Prof. Yeh has supervised one postdoctoral trainee, Dr. Judy Obliosca. Under Prof. Yeh's mentorship, Dr. Obliosca was highly productive and was subsequently recruited for a senior scientist position with Luna Innovations.

10. Organized service learning instruction

Prof. Yeh did not organize any service learning instruction while in rank as an Assistant Professor.

11. Special circumstances concerning the faculty member's teaching performance and innovative contributions

Prof. Yeh generously shares his enthusiasm for teaching with colleagues throughout the Cockrell School. He has contributed guest lectures to courses in BME, ASE, and ME.

While Prof. Yeh demonstrated considerable teaching skill even in his first few semesters at UT Austin, he has nonetheless embraced opportunities for growth and professional development related to teaching. Prof. Yeh participated in the ASEE National Effective Teaching Institute workshop in 2015 and has incorporated methods and technologies learned in the NETI workshop into his teaching.

12. Comparison to scores in the same classes achieved by others

It is not practical to compare Prof. Yeh's student evaluations for graduate teaching to that of other instructors because the courses that he has taught were not previously taught by other faculty in a similar enough format.

Direct comparison of Prof. Yeh's student evaluations for undergraduate teaching to that of other instructors is fair and informative. In the undergraduate elective course BME 354, other instructors were awarded an average of 3.4 for the instructor assessment and 3.1 for the course assessment in recent offerings. In contrast, Prof. Yeh was awarded an average of 4.7 for the instructor assessment and 4.1 for the course assessment. Similarly, in the undergraduate required course BME 113L/313L, other instructors were awarded an average of 3.3 for the instructor assessment and 3.0 for the course assessment in recent offerings, whereas Prof. Yeh was awarded an average of 4.1 for the instructor assessment and 3.6 for the course assessment. These comparisons strongly suggest that Prof. Yeh's exemplary teaching record is not simply due to the particular courses that he has taught but instead arises from his dedication to learning and deploying effective teaching practices. (*N.B.* I (Markey) have taught BME 113L and I can personally attest that it is a challenging undertaking. This is one of the earliest courses in the BME curriculum that requires substantial computer programming and many of our students begin the program anxious about their skills in this area.)

Summary

While in rank as an Assistant Professor, Prof. Yeh's has substantially contributed to the teaching responsibilities of the department. His record clearly demonstrates his enthusiasm for teaching and his genuine commitment to our students. Prof. Yeh is an accomplished instructor with an outstanding reputation as an educator among both his students and faculty peers.

Teaching Statement

Name of Candidate: Hsin-Chih (Tim) Yeh

Summary of teaching activities from 08/2012-06/2017:

- Taught 2 graduate level courses (BME385J and BME 381J) and 2 undergraduate courses (BME354 and BME113L/313L)
- Received 2016 Outstanding Faculty Award from the Cockrell School of Engineering and the Student Engineering Council

The past 5 years as an assistant professor at UT were no doubt the best time in my 45 years of life. It was simply because teaching is my calling and I truly enjoy working with the younger generations. Before becoming an assistant professor, I served in the military for 2 years (94-96 in Taiwan), worked in industry for 5 years (98-03 in San Diego, CA), studied at two different universities for 7 years combined (96-98 UCLA and 03-08 Johns Hopkins), and did research at a government laboratory for 3.5 years (09-12 Los Alamos National Lab). No job in my life was more challenging than being an assistant professor at UT, which requires tremendous effort in research, service, and teaching. But I have fought the good fight; I have finished the race; and I have kept the faith – the faith that I think every educator should have. That is to raise our own competitors. I have successfully helped many of our BME undergraduate and graduate students find their passions in specific topics and prepare themselves for the bigger challenges that they face later in their lives. In 2016 I was recognized by an Outstanding Faculty Award from our Student Engineering Council in the Cockrell School of Engineering. I consider this Award as one of the most important achievements that I have made in my life. In this statement, I describe my philosophy for serving as an educator and my teaching activities in the past 5 years.

Teaching Philosophy

For undergraduate training, my role is to help students prepare for post-college, professional engineering careers. My five years of industrial work experience is one of the best assets for me to teach students what they can expect as an engineer. These experiences enable me to link textbook knowledge to practice in the real world, which provides students with the encouragement that what they learn in the classroom is practical and beneficial for their future careers. Engineers are problem solvers so they must be adept at knowing how to simplify seemingly complex problems and apply the analytical skills they have honed in college to solve these problems. Engineers are inventors and fostering creativity in pursuing solutions to problems is key to their success. Students should practice adopting technologies used in different fields to improve methodologies important to their own fields. Multidisciplinary training expands the students' viewpoint and exposes them to different fields, which is a great way to trigger creative thinking. Further, engineers must be team players so developing leadership skills and learning how to coordinate with others in a team are critical. Most importantly, I wish to encourage my students to realize the professional and ethical responsibilities attached to an engineer, which should be based on their passions for engineering and their devotion to improving human lives.

My primary focus in the classroom is to develop undergraduate students' fundamental understanding of the basic principles of biomedical engineering. My experiences as both an instructor and a student have shown me that students can easily recognize the lecturer's level of preparation and enthusiasm. Students are more engaged and responsive when they trust that the instructor is well-prepared and passionate about the course material, a description which I feel reflects my own teaching style. I developed lecture materials far in advance of the classroom presentation and incorporated course-related materials that I had collected throughout the years. In my opinion, students' trust grows out of the instructor's genuine concern for their interests and needs. In Jan 2015, I participated in the **ASEE National Effective Teaching Institute** workshop and exposed to many cutting-edge electronic learning tools that can help students learn class materials more effectively and improve their presentation skills. I have started to incorporate those electronic tools that I learned from the workshop, such as Concept Warehouse, in my classes. These tools not only get students more actively engaged in class but also help improve students' conceptual understanding of fundamental principles that can be applied to a variety of new problems. In the long run, I plan to bring the Industrially-Situated Virtual Laboratory to the BME teaching labs to allow students to work in teams to perform an authentic process development or programming project as they are coached by me. I believe the technology-enabled learning environment holds great promise for the future engineering education as such an environment creates a greater space for the rich social interactions that promote deeper understanding of the

subjects – a level of understanding that the traditional low-tech classroom is never being able to achieve.

As for graduate students, whom I view as junior scientists, the most important training for them is to develop the capability to initiate original research topics and conduct independent study, and my mentoring philosophy follows this goal. I constantly update my class materials and present the latest technological breakthroughs to students, and at the same time, I urge students to report on and critique other state-of-the-art research that they find. The benefit of doing this is two-fold. First, the latest technology can better attract students' attention and keep them motivated. Secondly, through such a survey, students are engaged with different academic databases and search engines. This will help students learn to find the information that they need more efficiently and establish a habit of constantly keeping abreast of the latest developments (such as citation alert). Outstanding original research topics can be generated only if students have an adequate knowledge of what has been done or attempted by research groups around the world. In addition, I focus on developing the students' ability to communicate scientific concepts. To this end, I include additional assignments such as papers and oral presentations devoted to current and emerging issues within biomedical engineering.

For graduate students under my supervision, my emphasis is always on project planning and how to conduct high-quality experiments with limited resources and time. I believe this kind of training is missing in today's engineering curriculum. Drawing from my five years with a start-up company and eleven years with three young laboratories, I have developed many practical skills in running and coordinating research projects under various kinds of resource and funding constraints. These skills include finding outside resources, initiating collaborations with other groups, designing smart experiments, and building low-cost, custom-made setups for specific research purposes. These skills are critically important to our students. As future project leaders, students are trained not only to plan research but also to manage risks by always thinking of alternative plans based on the available resources, which is key to tackling research problems efficiently (and also surviving in today's funding situation).

Advising/Mentoring Strategy

The student-teacher connection is not always limited to the classroom. Indeed, fostering this relationship outside the classroom helps the teacher understand the students at different levels and helps the students realize the instructor's concern for their welfare. I strive to facilitate informal discussions and be approachable by keeping an open door policy to my office. As a tradition of my classes, I assign every student to come to meet with me during my office hours. Other than hearing students' opinions about the class, I ask students about their own research (if there is any) and what they like to do in the future. I like to share with students my personal experience, which often inspires and encourages them. My career advising has benefited many undergraduate and graduate students in the past 5 years. Many of my students wrote me thank-you cards after they left UT.

Undergraduate Level Coursework

BME 354 Molecular Sensors and Nanodevices for Biomedical Applications

This is a senior-level elective course that introduces basic elements and major classes of molecular sensors, nanodevices and biomedical microsystems (i.e. Micro-Electro-Mechanical Systems, MEMS) to our track 1 & 2 students. The course starts with the fundamental principles behind the operation of molecular sensors, nanodevices and biomedical microsystems. In the following weeks students learn the standard micro- and nano-fabrication techniques that they will need to design and manufacture microsystems. Towards the end a wide spectrum of special topics related to the real-world applications of electrical, mechanical, and optical sensors are covered. Students attend lectures 3 times a week and office hours for project discussion. Course assessments include bi-weekly problem sets, article critiques, a project presentation, two midterms and a final exam. As a tradition of this class, I have one lecture about Nobel Prizes in that year (right after the announcement of the award) and 2-3 guest lectures given by my colleagues in CSE (such as Nanshu Lu for wearable electronics and Ray Chen for nanophotonic sensors). This course was originally designed by our former colleague John X. J. Zhang, but I have made substantial changes to the class content.

To raise students' interest, I shared with students my stories in the MEMS industry (98-03). I brought to the class real-world optical MEMS devices that I developed as an R&D engineer 17 years ago. Students were greatly inspired by those fully integrated, commercialized MEMS devices, which clearly triggered their thoughts to pursue a career in instrument development. I also shared my experience in technology commercialization, talking about how a university laboratory invention could become a start-up company product.

Connecting classroom knowledge to real-world professions is my strength and the unique advantage of my background. In this senior elective class typically I have about 20-30 students. I make sure that I do "career advising" to every student throughout the semester. Some senior student told me that they have never had a chance to talk to a faculty member in depth and received comprehensive career advising after they joined UT. They enjoyed and appreciated the career advising opportunity very much.

As of today, this course was taught three times by me (Fall 14-16). Based upon students' comments, I am continuing to improve my course organization and structure. The historical CIS results of BME 354 are shown below:

Year	2010	2011	2012	2014	2015	2016
Instructor	3.7	3.2	3.4	4.6	4.6	4.8
Course	3.5	2.7	3.2	3.9	3.9	4.4

BME 113L/313L Introduction to Numerical Methods in Biomedical Engineering

This is a sophomore-level BME core course that introduces students to MATLAB programming and the numerical methods often used in biomedical engineering problems. Although this was a one-credit hour class before 2017, the amount of effort that I put into this class was equivalent to a three-credit hour course (as I also went to the lab sessions to talk to students and asked students to come to my weekly office hours for additional instruction). This class eventually became a three-credit hour course in 2017. Divided into 6 modules, this course broadly covers a vast of topics such as numerical integration, numerical differentiation, interpolation, curve fitting, data analysis, sampling and estimation, error analysis, analysis of ordinary differential equations, symbolic computation, and scientific visualization. For each module, the following approach is used: 1) formulate problems; 2) explore possible approaches and select a specific one; 3) develop an algorithm/solution; 4) obtain results and analyze errors; and 5) discuss findings. Overall, fundamental similarities between various numerical approaches are stressed, and vital differences are discussed. Every week students attend two lectures and a laboratory session for three hours. Course assessments included quizzes, weekly lab assignments, three midterms and a final exam.

To attract students' attention, I incorporated many non-textbook MATLAB programming examples into the class materials, including the codes that I developed as an R&D engineer in industry 17 years ago and the codes that my graduate students recently developed for their research. After seeing those real-world demonstrations, students were inspired to use MATLAB and numerical methods for their independent research projects and other BMEs courses. I specifically emphasized the importance of using MATLAB for simulation and animation. Whereas both of these topics were not the focus of this class, I believed our students could give an impressive job talk at EXPO if they knew how to make a research video using MATLAB simulation and animation. Drawing from my 5 years of employment experience in industry, I told students that a video is worth a thousand words and can significantly enhance their chance of getting a job at interview.

I paid special attention to **female, minority and underrepresented** students in this core class (typically having more than 100 students). In my weekly meeting with TAs, I specifically asked for a list of students who did not perform well in quizzes and lab reports. I set my priority to meet with female, minority and underrepresented students who struggled with the class. For instance, in spring 2017 I noticed a female African American student was not turning in two consecutive lab reports on time in the first month of the semester. I immediately scheduled a meeting with the student and told her that she had underestimated the consequence of missing lab reports. She told me her problems in programming and I immediately came out with a number of ways to help her. I made sure that she was not left behind and we constantly met during my office hours throughout the entire semester. After hearing many encouraging words from me, she devoted more time to programming and eventually passed the class with a C+.

This course was taught three times by me (spring 14, 15 and 17). I truly enjoy teaching this core class and will continue to improve my teaching skills. The historical CIS results of BME 113L/313L are shown below:

Year	2011	2012	2013	2014	2015	2016	2017
Instructor	3.0	2.9	3.7	3.8	4.4	3.4	4.1
Course	2.6	3.2	3.3	3.2	3.9	3.0	3.8

Graduate Level Coursework

BME 381J Fluorescence Microscopy and Spectroscopy

The main objective of the course is to introduce to students the broad impact of fluorescence microscopy and spectroscopy on all fields of science and engineering, with emphasis on applications in biological and medical research. The course starts with the fundamentals of fluorescence microscopy, spectroscopy, instrumentation, fluorescent probes, and live-cell labeling techniques. Then we move to special topics in single-molecule detection, commercialized fluorescence techniques and advanced microscopy (e.g. multi-photon microscopy, super-resolution microscopy, light-sheet microscopy and molecular tracking). Latest applications of fluorescence microscopy and spectroscopy in optogenetics, nanomedicine, and quantitative biology are also covered. Students are asked to select a topic of their interest, which usually aligns with their own research projects, to make a presentation in class and write a review paper. Through these exercises students learn how to present an idea and how to search for and utilize cutting-edge techniques (especially those in different disciplines) in solving problems that they encounter in their graduate studies. This course does not have a textbook due to the wide spectrum of topics. To develop the course, I take materials from six supplementary reference books and nearly hundreds of journal articles. Course assessments include assignments, critiques on articles, literature survey, a project presentation, two midterms, a final exam, and a final review article.

This class aligned perfectly with my own research and I was actually the one who benefited the most from it. I constantly updated my class materials and made sure that I presented the latest research results in the field to our graduate students. Graduate students appreciated learning the latest technologies and were greatly inspired by those astonishing breakthroughs. Some even told me the technologies that they learned from the class were immediately applied to their own research. Usually there were 3-4 graduate students from physics and chemistry department in this class. I made sure that I talked to every student during my office hours and understood an individual's learning needs. Every year I tailored my class content to address the special learning needs of our students.

This course was 100% developed by myself and was taught twice by me (fall 13 and spring 16). One particular item that I can improve is to return students' tests/assignments sooner. CIS results below.

Year	2013	2016
Instructor	4.2	4.8
Course	4.0	4.5

BME 385J Biomedical Micro- and Nanotechnology (crosslisted as ChE 384)

This course introduces the concepts needed to understand and work in the emerging field of biomedical micro- and nanotechnology. Divided into 6 modules, this course broadly covers a vast of topics in micro- and nanofabrication, micro- and nanofluidics, single-cell manipulation and single-cell analysis, molecular probes, nanobiosensors, and nanomedicine. Seven supplementary reference books are used and additional readings are assigned from journal articles. Course assessments included homework assignments, critiques on articles, literature survey, a project presentation, two midterms, a final exam, and a final review article.

This class again aligned perfectly with my own research in nanomaterials science. Other than talking about the latest development in micro- and nanotechnology, I specifically mentioned the micro- and nanotechnology that started here on UT campus or in Texas. I believed this information was critically important to our graduate students as they might be able to establish new collaborations on campus to help out their own research. I also shared with students my own experience in nanomaterials development and patent applications.

This course was previously taught by Nicholas Peppas, but I have substantially changed the course content. I have only taught this class once (spring 13). My CIS results of BME 385J are shown below:

Year	2013
Instructor	4.8
Course	4.7

Other Teaching Activities

In addition to my primary teaching responsibilities, I have given multiple guest lectures in other courses including: BME 381J: Functional Imaging Laboratory; ASE 375: Electromechanical Systems; BME 349: Biomedical Instrumentation; ME 379M: BioMEMS and BioNEMS; BME 382J: Biomimetic Design and Engineering.

Candidate's Summary of Teaching

(In rank for assistant professors; since last promotion review for associate professors)

Table 1. Summary of Course-Instructor Ratings

Metric	Value
Total # of students taught in organized courses	410
Average instructor evaluation for UG courses	4.38
Average instructor evaluation for Grad courses	4.6
Average course evaluation for UG courses	3.85
Average course evaluation for Grad courses	4.4

Table 2. Course Schedule by Semester

Course	F 12	S 13	F 13	S 14	F 14	S 15	F 15	S 16	F 16	S 17
BME 385J		7								
BME 381J			16					16		
BME 113L/313L				102		83				126
BME 354					20		31		9	

Table 3. Summary of Graduate Students Currently Supervised at UT Austin

Student Name	Co-Supervisor*	Degree	Start Date	Date Reached Candidacy	Date Expected to Reach Candidacy	Expected Graduation Date
Yen-Liang Liu		PhD	08/2013	8/29/2016		Spring 2018
Yuan-I Chen		PhD	08/2016		Summer 2019	Spring 2021

* Provide name of co-supervisor and department.

Tim [Hsin-Chih] Yeh
Department of Biomedical Engineering
Course Rating Averages

Tenure candidates must include all years in rank.
All other candidates must include, at minimum, the three most recent years.
What source was used to complete this chart? _ MyCIS

Course Number: BME 354 (Undergraduate)

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2014	20	14	4.6	3.9
Fall 2015	31	27	4.6	3.9
Fall 2016	9	9	4.8	4.4
Mean	**20**	**18**	**4.7**	**4.1**

Course Number: BME 113L/313L (Undergraduate)

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 2014	102	22	3.8	3.2
Spring 2015	83	58	4.4	3.9
Spring 2017	126	79	4.1	3.8
Mean	**105**	**69**	**4.1**	**3.6**

Course Number: BME 381J (Graduate)

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2013	16	12	4.2	4.0
Spring 2016	16	15	4.8	4.5
Mean	**16**	**15**	**4.5**	**4.3**

Course Number: BME 385J (Graduate)

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 2013	7	6	4.8	4.7
Mean	**7**	**6**	**4.8**	**4.7**

All Ins	4.5
All Course	4.1

UG Ins	4.4
UG Course	3.9

G Ins	4.7
G Course	4.5

Course Instructor Survey Results

Name/EID: YEH, HSIN-CHIH (hy3982)
Department: Biomedical Engineering
Report Date: 07-21-2017

Semester	Unique Number	Course Number	Course Title	Instruction Type	Enrollment	No. of Surveys Returned	Avg. Overall Instructor Rating	Avg. Overall Course Rating
Spring 2013	14352	BME 385J	BIOMED MICRO & NANOTECHNOLOGY	Organized	7	6	4.8	4.7
Fall 2013	14515	BME 381J	FLUORESNCE MICRO-/SPECTROSCOPY	Organized	16	12	4.2	4
Spring 2014	14520	BME 113L	INTRO NUMERICAL METHS IN BME	Organized	102	22	3.8	3.2
Fall 2014	14595	BME 354	MOLEC SEN/NANODEV FOR BME APPL	Organized	20	14	4.6	3.9
Spring 2015	13915	BME 113L	INTRO NUMERICAL METHS IN BME	Organized	83	58	4.4	3.9
Fall 2015	14160	BME 354	MOLEC SEN/NANODEV FOR BME APPL	Organized	31	27	4.6	3.9
Spring 2016	14325	BME 381J	13-FLUORESCENCE MICR/SPCTRSCPY	Organized	16	15	4.8	4.5
Fall 2016	14210	BME 354	MOLEC SEN/NANODEV FOR BME APPL	Organized	9	9	4.8	4.4
Spring 2017	14035	BME 313L	INTRO NUMERICAL MTHDS IN BME	Organized	126	79	4.1	3.8

THE UNIVERSITY OF TEXAS AT AUSTIN
Biomedical Engineering
Cockrell School

PEER EVALUATION
for the Formative Assessment of Teaching[1]

Faculty Member Evaluated: Tim Yeh | **Current Rank: Assistant Professor**

Date of Evaluation: April 14, 2014 | **Course Observed: BME113L**

	Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content				
1. Presented main ideas clearly	☐	☐	■	☐
2. Provided variety of supporting information	☐	☐	☐	■
3. Clearly addressed relevancy of main ideas	☐	☐	☐	■
4. Required higher order thinking by students	☐	☐	■	☐
5. Related ideas to students' prior knowledge	■	☐	☐	☐
6. Provided definitions for new terms/concepts	☐	☐	☐	■
Organization				
7. Connected introduction to previous classes	☐	☐	☐	■
8. Stated organization/objectives	☐	☐	☐	■
9. Used clear, effective transitions with summaries	☐	☐	☐	■
10. Had a clear and organized plan	☐	☐	■	☐
11. Concluded by summarizing main ideas	☐	☐	■	☐
12. Connected to future classes/courses/expectations	☐	☐	■	☐
Interaction				
13. Questioned students at different learning levels	☐	☐	■	☐
14. Provided sufficient wait time after asking questions	☐	☐	☐	■
15. Encouraged student questions	☐	☐	■	☐
16. Gave informative responses to questions	☐	☐	☐	■
17. Had good rapport/engagement with students	☐	☐	☐	■
Verbal/Nonverbal				
18. Was confident and enthusiastic	☐	☐	☐	■
19. Used clear articulation and pronunciation	☐	☐	■	☐
20. Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	■	☐
21. Spoke extemporaneously	☐	☐	■	☐
22. Minimized any distracting accent/language	☐	☐	■	☐
23. Projected voice to be easily heard	☐	☐	■	☐
24. Used appropriate pace of delivery	☐	☐	☐	■
25. Made adequate eye contact with varied students	■	☐	☐	☐
Use of Media				
26. Used classroom technology proficiently	☐	☐	☐	■
27. Made visual aids easy to read	☐	☐	☐	■
28. Provided effective outline/handouts	■	☐	☐	☐

Overall Rating

Overall, I rate this instructor's performance as:	**Deficient**	**Satisfactory**	**Very Good**	**Excellent**

NARRATIVE EVALUATION
Use additional sheet(s) as necessary.

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:
Prof. Yeh began his lecture with clear presentation of objectives for the lecture and ideas behind. The lecture started and continues with an appropriate pace that was adjusted based on student participation and feedback. The lecture was interactive in nature – students were asked to participate with Q&A and simple tasks performed by each student. Prof. Yeh used both slide projector and white board effectively – slides were used to present material while white board was used for demonstration and further discussion of the presented concepts. In addition, while interacting with students, Prof. Yeh linked current material to previous lectures and real-life examples to demonstrate the material more effectively. Furthermore, Prof. Yeh allowed students to ask questions. During the discussion, the instructor answered the questions concisely and to the point demonstrating his superb knowledge of the material. At the end of the lecture, Prof. Yeh summarized the main concepts covered within the lecture, provided the instructions for the upcoming lab sessions, and briefly outlined the main idea of the future lecture.

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:
Prof. Yeh's teaching was excellent overall. Only minor comments can be made. The BME113L is a computer-based class and students were allowed to use their notebook computers. Unfortunately, some of them used their computers for activities not related to the class. However, it is not clear what can be done to solve such a problem. Furthermore, some students sitting on the back of the classroom were not engaged. Again, given a large number of students in the class, it is not clear how to address this issue. Finally, during the lecture, more references to a textbook and upcoming laboratory session would be useful.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

OVERALL ASSESSMENT:
Overall, I enjoyed Prof. Yeh's lecture and his teaching style. I taught this class before and Tim did great job teaching this difficult class. I believe his students also appreciate the Prof. Yeh's effort to explain the material. He presented everything in clear and efficient way, provided variety of supporting information, and challenged the students with higher order thinking. He had good control of the lecture via interaction with students and providing necessary feedback. Overall organization of the lecture was excellent. Language of Prof. Yeh was clear and understandable, students can hear him from anywhere in the room, he did not use verbalized pauses and overall it felt as a comfortable conversation between the instructor and the students. Prof. Yeh used available media (projector/screen, white board, etc.) to provide visual aids. He demonstrated an enthusiasm and command for the subject matter. While some minor improvements can always be made, Prof. Yeh is a very good if not an excellent teacher.

Date of Conference: April 17, 2014 **Observer Signature:** Stanislav Emelianov

Stanislav Emelianov

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen. *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105.

Updated: January 14, 2013

THE UNIVERSITY OF TEXAS AT AUSTIN
Biomedical Engineering
Cockrell School

PEER EVALUATION
for the Formative Assessment of Teaching[1]

Faculty Member Evaluated: Tim Yeh **Current Rank:** Asst Prof

Date of Evaluation: 4/20/15 **Course Observed:** BME 113L

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☑	☐
2.	Provided variety of supporting information	☐	☐	☑	☐
3.	Clearly addressed relevancy of main ideas	☐	☐	☑	☐
4.	Required higher order thinking by students	☐	☐	☑	☐
5.	Related ideas to students' prior knowledge	☐	☐	☑	☐
6.	Provided definitions for new terms/concepts	☐	☐	☑	☐
Organization					
7.	Connected introduction to previous classes	☐	☐	☑	☐
8.	Stated organization/objectives	☐	☐	☑	☐
9.	Used clear, effective transitions with summaries	☐	☐	☑	☐
10.	Had a clear and organized plan	☐	☐	☑	☐
11.	Concluded by summarizing main ideas	☐	☐	☐	☑
12.	Connected to future classes/courses/expectations	☐	☐	☑	☐
Interaction					
13.	Questioned students at different learning levels	☐	☐	☑	☐
14.	Provided sufficient wait time after asking questions	☐	☐	☑	☐
15.	Encouraged student questions	☐	☐	☐	☑
16.	Gave informative responses to questions	☐	☐	☑	☐
17.	Had good rapport/engagement with students	☐	☐	☐	☑
Verbal/Nonverbal					
18.	Was confident and enthusiastic	☐	☐	☑	☐
19.	Used clear articulation and pronunciation	☐	☐	☑	☐
20.	Avoided verbalized pauses (e.g., "uh," "ah," etc.) "ok"	☐	☐	☑	☐
21.	Spoke extemporaneously	☐	☐	☑	☐
22.	Minimized any distracting accent/language	☐	☐	☑	☐
23.	Projected voice to be easily heard	☐	☐	☑	☐
24.	Used appropriate pace of delivery	☐	☐	☑	☐
25.	Made adequate eye contact with varied students	☐	☐	☑	☐
Use of Media					
26.	Used classroom technology proficiently	☐	☐	☑	☐
27.	Made visual aids easy to read	☐	☐	☑	☐
28.	Provided effective outline/handouts	☐	☐	☑	☐

Overall Rating

Overall, I rate this instructor's performance as:	**Deficient**	**Satisfactory**	**Very Good**	**Excellent**

NARRATIVE EVALUATION

Use additional sheet(s) as necessary.

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Well organized; good rapport with students; respectful to students; respect is returned. Obviously has invested much effort in teaching

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

Powerpoint lecture tends to be fast paced with information delivery. Example problem in text was only referred to. Working out examples is actually an excellent way to model thinking for problem solving.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

Constitutive eqs (-) sign ⇒ shows 2nd law of thermo throughout nature. Broader learning opportunity

Repeat questions so all students can hear

Could strengthen applications to more clearly motivate learning

OVERALL ASSESSMENT:

Developing a good teaching style

Date of Conference: 4/30/2015 **Observer Signature:** Kenneth R. Diller

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen. *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105.

Updated: January 14, 2013

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: __Tim Yeh_____ Current Rank:___Assistant Professor _____

Date of Evaluation: ____11 November 2015____ Course Observed:___BME 354 _____

	Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content				
1. Presented main ideas clearly	☐	☐	X	☐
2. Provided variety of supporting information	☐	☐	x	☐
3. Clearly addressed relevancy of main ideas	☐	☐	☐	x
4. Required higher order thinking by students	☐	☐	x	☐
5. Related ideas to students' prior knowledge	☐	☐	☐	x
6. Provided definitions for new terms/concepts	☐	☐	☐	x
Organization				
7. Connected introduction to previous classes	☐	☐	☐	x
8. Stated organization/objectives	☐	☐	☐	x
9. Used clear, effective transitions with summaries	☐	☐	x	☐
10. Had a clear and organized plan	☐	☐	x	☐
11. Concluded by summarizing main ideas	☐	☐	☐	x
12. Connected to future classes/courses/expectations	☐	☐	x	☐
Interaction				
13. Questioned students at different learning levels	☐	☐	☐	x
14. Provided sufficient wait time after asking questions	☐	☐	x	☐
15. Encouraged student questions	☐	☐	☐	x
16. Gave informative responses to questions	☐	☐	☐	x
17. Had good rapport/engagement with students	☐	☐	☐	x
Verbal/Nonverbal				
18. Was confident and enthusiastic	☐	☐	☐	x
19. Used clear articulation and pronunciation	☐	☐	☐	x
20. Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	☐	x
21. Spoke extemporaneously	☐	☐	☐	x
22. Projected voice to be easily heard	☐	☐	x	☐
23. Used appropriate pace of delivery	☐	☐	x	☐
24. Made adequate eye contact with varied students	☐	☐	☐	x
Use of Media				
25. Used classroom technology proficiently	☐	☐	x	☐
26. Made visual aids easy to read	☐	☐	x	☐
27. Provided effective outline/handouts	☐	☐	x	☐
Overall Rating				
Overall, I rate this instructor's performance as: (Circle one)	Deficient	Satisfactory	Very Good	Excellent

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Professor Yeh began the class with some announcements including some guidance on the upcoming midterm exam. He clearly stated the topic for the day and provided a clear introduction to the topic. He even related the topic to the BME seminar speaker for the week and encouraged students to attend the seminar. Linking the lecture topic to the seminar speaker was very effective at capturing the students'

attention and engaging the class from the very beginning. Professor Yeh used humor to introduce the topic of DNA bar codes very effectively. One of the biggest strengths of his teaching style is his enthusiastic delivery method. His genuine enthusiasm also captured students' attention.

Prof Yeh used traditional powerpoint slides to deliver the material throughout the lecture. The lecture slides had very good use of font colors and graphics, and served to summarize the reading materials that served as the topic of the lecture. The style of the class was a traditional lecture, but Prof Yeh posed questions to the class throughout the lecture to make the class more interactive. Almost every time a student raised his or her hand to answer a question, Prof Yeh called the student by name. Knowing the students' names was very impressive and surely was noted and appreciated by the students. Throughout the class Prof Yeh also drew on examples from the scientific literature, which helped keep the students engaged and attentive.

Overall, Prof Yeh created a very good classroom environment and led the class effectively.

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

Prof Yeh tended to stand in the same spot for the majority of the class. Moving around more may add more variety to the class, although too much motion can also be distracting. Overall, this is a very minor point of criticism.

Another aspect to consider could be limiting the use of laptops during class, as I noticed a few students browsing the web or on social media during the lecture. However, the majority of students using laptops were using them to follow the lecture notes or to take notes. The proper use of laptops during class is a challenge to all faculty, but Prof Yeh may want to consider making regular reminders to students about proper use of laptops and phones.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

OVERALL ASSESSMENT:

I was very impressed with Prof Yeh's teaching style and in particular, his enthusiasm for teaching. His students benefit tremendously from his dedication to teaching. I was inspired by observing his class!

Date of Course: _11 November 2015 _____ Observer Signature: Andrew Dunn
and Discussion

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen. *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994,

Updated: November 4, 2015

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: __Tim Yeh_____ Current Rank:__Assistant Professor_____

Date of Evaluation: _____11/14/2016_____ Course Observed:__ BME 354/382J.3_____

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☐	☒
2.	Provided variety of supporting information	☐	☐	☐	☒
3.	Clearly addressed relevancy of main ideas	☐	☐	☒	☐
4.	Required higher order thinking by students	☐	☐	☒	☐
5.	Related ideas to students' prior knowledge	☐	☐	☒	☐
6.	Provided definitions for new terms/concepts	☐	☐	☒	☐
Organization					
7.	Connected introduction to previous classes	☐	☐	☐	☒
8.	Stated organization/objectives	☐	☐	☒	☐
9.	Used clear, effective transitions with summaries	☐	☐	☒	☐
10.	Had a clear and organized plan	☐	☐	☒	☐
11.	Concluded by summarizing main ideas	☐	☐	☒	☐
12.	Connected to future classes/courses/expectations	☐	☐	☒	☐
Interaction					
13.	Questioned students at different learning levels	☐	☐	☐	☒
14.	Provided sufficient wait time after asking questions	☐	☐	☒	☐
15.	Encouraged student questions	☐	☐	☒	☐
16.	Gave informative responses to questions	☐	☐	☒	☐
17.	Had good rapport/engagement with students	☐	☐	☒	☐
Verbal/Nonverbal					
18.	Was confident and enthusiastic	☐	☐	☐	☒
19.	Used clear articulation and pronunciation	☐	☐	☒	☐
20.	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	☒	☐
21.	Spoke extemporaneously	☐	☐	☒	☐
22.	Projected voice to be easily heard	☐	☐	☒	☐
23.	Used appropriate pace of delivery	☐	☐	☒	☐
24.	Made adequate eye contact with varied students	☐	☐	☐	☒
Use of Media					
25.	Used classroom technology proficiently	☐	☐	☒	☐
26.	Made visual aids easy to read	☐	☐	☒	☐
27.	Provided effective outline/handouts	☐	☐	☒	☐
Overall Rating					
Overall, I rate this instructor's performance as: (**Circle one**)		Deficient	Satisfactory	Very Good	(Excellent)

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Dr. Yeh demonstrated immense passion about teaching and has done an excellent job explaining the concepts and ideas. The class was well structured and the pace was smooth. He was actively involving the students throughout the class. Dr. Yeh was very knowledgeable about the subjects and provided immediate feedback to students' inquiries.

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

Could use some hands-on exercises where students spend more time solving problems will be helpful. Interactions among students can also be increased.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

OVERALL ASSESSMENT:

Overall, Dr. Tim Yeh is an outstanding teacher. It is clear that he has devoted significant amount of time and effort to his teaching, from preparing the materials to effective teaching techniques.

Date of Course: 11/14/2016 and Discussion

Observer Signature: Pengyu Ren

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen. *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105.

Updated: September 14, 2016

THE UNIVERSITY OF TEXAS AT AUSTIN
OFFICE OF GRADUATE STUDIES
COMMITTEE REPORT, MASTERS AND DOCTORAL
FOR YEH, HSIN-CHIH

Biomedical Engineering

NAME	EID	LAST SEM	COMM POSITION	MAST OR DOCT	DEGREE	FIELD	YYS	2ND DEGREE	FIELD	YYS
BHAVE, GAURI SURESH	gsb462	146	MEMBER	D	PH.D.	BIOMEDICAL EN	20146			
CHEN, PENG	pc9552	146	CO-CHAIR	D	PH.D.	BIOMEDICAL EN	20146			
DEGROOT, ANDRE C.	ad39288	179	MEMBER	D						
FOOTE, AARON ZACHARY	azf88	176	MEMBER	D						
GADOK, AVINASH KAUR	akg882	172	MEMBER	D	PH.D.	BIOMEDICAL EN	20172			
HASSAN, AHMED MOUSTAFA	amh5536	179	MEMBER	D						
JING, ZHIFENG	zj2244	179	MEMBER	D						
LEE, YOUNGKYU	yl6734	142	MEMBER	D	PH.D.	ELECTRICAL AN	20142			
LIU, CONG	cl33734	172	CHAIR	D	PH.D.	BIOMEDICAL EN	20172			
LIU, YEN-LIANG	yl23939	179	CHAIR	D						
MILLER, DAVID ROGER	drm2963	179	MEMBER	M	M.S.E.	BIOMEDICAL EN	20166			
MILLER, DAVID ROGER	drm2963	179	MEMBER	D						
MU, XIAOJIA	xm538	146	MEMBER	D	PH.D.	BIOMEDICAL EN	20146			
MURALIDHARAN, BHARADWAJ	bm22366	176	MEMBER	D						
NGUYEN, HIEU THI MINH	htn683	179	MEMBER	D						
PERILLO, EVAN PAUL	epp288	172	CO-CHAIR	D	PH.D.	BIOMEDICAL EN	20172			
PURANIK, AMEY SHREEKANT	asp863	152	MEMBER	D	PH.D.	CHEMICAL ENGI	20152			
ROBINSON, DONALD A. III	dar2798	162	MEMBER	D	PH.D.	CHEMISTRY	20162			
SCHRANDT, CHRISTIAN JOHN	cjs3278	152	MEMBER	D	PH.D.	BIOMEDICAL EN	20152			
SLAUGHTER, BRANDON VAUGHN	bvs	139	MEMBER	D	PH.D.	BIOMEDICAL EN	20139			
SNEAD, WILTON THOMAS	ws5387	179	MEMBER	D						
STEICHEN, STEPHANIE D.	sds2845	162	MEMBER	D	PH.D.	BIOMEDICAL EN	20162			
WANG, LINGYUN	wangl73	129	MEMBER	D	PH.D.	ELECTRICAL AN	20129			
WANG, YOUMIN	yw3286	132	MEMBER	D	PH.D.	ELECTRICAL AN	20132			

former student of John X.J. Zhang after departure to Dartmouth

FOR YEH, HSIN-CHIH

NAME	EID	LAST SEM	COMM POSITION	MAST OR DOCT	DEGREE	FIELD	YYS	2ND DEGREE	FIELD	YYS
WECHSLER, MARISSA E.	mw27528	179	MEMBER	D						
WU, CHUN-HSIEN	cw26346	146	MEMBER	D	PH.D.	BIOMEDICAL EN	20146			
YAN, HAI	hy4359	176	MEMBER	D	PH.D.	ELECTRICAL AN	20176			
YANG, BIN	by2367	156	MEMBER	D	PH.D.	BIOMEDICAL EN	20156			
ZHANG, YAO	yz9289	179	MEMBER	D						

List of Supervised Postdoctoral Fellows – Hsin-Chih "Tim" Yeh

- Judy Obliosca, PhD - 11/12/2012-1/10/2017
  - PhD from National Tsing Hua University, June 2012
  - Currently Research Scientist at Luna Innovations, Incorporated

Research Assessment

Budget Council Assessment for Hsin-Chih (Tim) Yeh
Prepared by Budget Council Member: Tom Milner

Dr. Yeh's research is focused primarily on the development of nano-probes and nano-sensors for application in laser tracking microscopy techniques to monitor the dynamics, kinetics and signaling of various processes in cells and tissues. Dr. Yeh's research impacts quantitative biology where probing the actions of specific molecules and structures in cells and tissues can provide an important understanding for a wide milieu of research efforts including for example genetics including DNA and RNA trafficking, action of therapeutic agents, and drug resistance. Dr. Yeh's research at UT Austin began with a focus on few-atom noble-metal nanoclusters and has expanded to include the development of laser microscopy approaches to track these probes. Dr. Yeh has established himself as a leading investigator at the national level and has made important contributions to both the development and understanding of nano-probes together with demonstrations of their application using laser tracking microscopy to investigate cell and molecular processes.

Although Dr. Yeh began his research with the few-atom noble metal nanoclusters while at Los Alamos National Laboratory, while at UT Austin he has made seminal contributions in this area that have significantly expanded the fundamental understanding, design and potential capability of nanocluster probes. Dr. Yeh and his team demonstrated that these probes can be designed and synthesized so that fluorescent emission can be tuned from the green to near infrared. This important finding was published in ACS Nano (Impact Factor 13.9) in 2014 and has been cited thirty-times over a three-year time period. The tuning capability of Dr. Yeh's nanoclusters has not only opened new avenues in the science of few-atom noble metal nanocluster probes but also may expand their practical utility to monitor simultaneously a variety of processes and events in cells and tissues.

On the application side, Dr. Yeh has applied his nanocluster probes to identify single-nucleotide polymorphisms (SNPs), detection of N6-methyladenosine (m^6A), and monitoring of drug particle transport in tumors in vivo. Recently Dr. Yeh's laboratory demonstrated that LNA thymidine monomer enables the differentiation of four allelic variants by melting temperature and may aid in understanding how SNPs can impact a patient's response to drug therapy. This work was recently (2017) published in the *Journal of American Chemical Society* (impact factor 13.858) and - considering the potential practical applications - disclosed to the UT office of technology commercialization. Dr. Yeh's laboratory was first to show DNA based few-atom nanoclusters for detection of methyladenosine (m^6A). The utility of Dr. Yeh's probes to study epigenetic mechanisms and regulatory roles of m^6A in tumor cell differentiation in cancer has provided an important diagnostic research tool. This work was published in the *Journal of the American Chemical Society* (impact factor 13.858) in 2015 and a provisional patent application has been filed.

While in rank, Dr. Yeh as authored or co-authored fourteen peer-reviewed publications. Of these, five publications have a lead author who was Dr. Yeh's sole-supervised graduate student, three have a lead author who was co-supervised by Dr. Yeh, and four have a lead

author who was a post-doctoral researcher working in Dr. Yeh's laboratory. Dr. Yeh's research has been published in a number of high impact journals including *JACS* (2), *ACS Nano* (1), *Nanoscale* (2), and *Nature Communications* (1).

Dr. Yeh has demonstrated he is able to compete successfully at the national level to support his research. He is the principal investigator for an NIH grant entitled "An integrated imaging tool for probing EGFR subcellular trafficking in real time" (total, $430K, $250K share); Dr. Yeh is the principal investigator for an NSF grant entitled "Engineering silver clusters for molecular measurement" (total $550k, $300 share); Dr. Yeh is the sole PI on a Welch Foundation grant (total $350k, $350k share). While in rank, Dr. Yeh has been the sole PI of two internal Texas 4000 competitions ($25K x 2).

In summary, Dr. Yeh has demonstrated himself to be a leading young researcher at the national level. He has published his research results regarding both the fundamental science and applications of few-atom noble metal nano-probes in leading research journals with high impact factors. He has built up a sustainable research laboratory with a pipeline of graduate students and is expected to continue making important contributions to biomedical engineering.

List of Five Most Significant Works – Hsin-Chih "Tim" Yeh

1. 24. E.P. Perillo, Y.-L. Liu, K. Huynh, C. Liu, C.-K. Chou, M.-C. Hung, H.-C. Yeh*, and A. Dunn* (co-corresponding authors) "Deep and high-resolution three-dimensional tracking of single particles using nonlinear and multiplexed illumination," Nature Communications 6, 7874, 2015.

2. 22. J.M. Obliosca, M.C. Babin, C. Liu, Y.-L. Liu, Y.-A. Chen, R.A. Batson, M. Ganguly, J.T. Petty, and H.-C. Yeh, "A complementary palette of NanoCluster Beacons," ACS Nano 8(10): 10150-10160, 2014.

3. 32. J.M. Obliosca, S.Y. Cheng, Y.-A. Chen, M.F. Llano, Y.-L. Liu, D.M. Imphean, D. Bell, J.T. Petty, P. Ren and H.-C. Yeh, "LNA thymidine monomer enables differentiation of the four singlenucleotide variants by melting temperature," JACS 139(20): 7110-7116, 2017.

4. 25. Y.-A. Chen, J.M. Obliosca, Y.-L. Liu, C. Liu, M.L. Gwozdz, and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N6-methyladenine," Journal of the American Chemical Society 137(33): 10476-10479, 2015.

5. 29. Y.-L. Liu, E.P. Perillo, C. Liu, P. Yu, C.-K. Chou, M.-C. Hung, A.K. Dunn and H.-C. Yeh, "Segmentation of 3D trajectories acquired by TSUNAMI microscope: An application to EGFR trafficking," Biophysical Journal 111(10): 2214-2227, 2016.

Research Statement

Name of Candidate: Hsin-Chih (Tim) Yeh

Summary of research activities from 08/2012-06/2017:

- Received more than $1.4 million in research funding
- Received NIH-NCI-IMAT R21 Grant, NSF-CHE Grant, Texas 4000 Grant (twice) and Welch Foundation Grant
- Published 14 peer reviewer journal articles at UT Austin (33 overall)
- Gave 22 invited departmental or institutional seminars and 17 conference presentations while at UT Austin
- Filed one invention disclosure and two patent applications at UT Austin (4 US patents awarded overall)

Our research focuses on creating and studying new nanomaterials that have the potential to be used as future molecular probes (i.e. nanobiosensors) with unprecedented sensing capabilities, and developing new imaging tools for fundamental biomedical research at the single-molecule, single-cell level. Although we are in the post-genome era, we still face many unsolved questions in functional genomics and cellular signaling network. This is mainly due to the fact that we are ill-equipped with research tools to elucidate the sophisticated genetic processing and signaling mechanisms that are often obscured by cellular heterogeneity and the stochastic nature of molecular processes. Among all the tools that are currently being developed, it is increasingly evident that probes with superior specificity and sensitivity and instruments with single-molecule addressing capability are critical to characterize and understand this inherent variability in complex biological systems. Nanotechnology and single-molecule detection hold great promise for future quantitative biology. Along these lines, we have recently turned few-atom noble metal nanoclusters into low-cost, multicolor, and activatable fluorescent probes that can be used for DNA methylation identification (2015 *JACS*), enzyme activity detection (2015 *Nanoscale*), and SNP discrimination (2012 *JACS* and 2017 *JACS*). We have achieved the results that no other molecular probes can achieve – this highlights the great potential of novel nanomaterials in biomedical applications (2013 *Nanoscale* and 2014 *ACS Nano*). In addition, we have built two state-of-the-art 3D single-molecular tracking microscopes to investigate the internalization, transport and signaling dynamics of receptors, viral capsids and drug molecules in live monolayer cell cultures and in cancer spheroids (2015 *Nature Communications*, together with Dr. Andy Dunn, and 2015 *APL*). Molecular trafficking within engineered 3D multicellular models is critical to the understanding of the development and treatment of various diseases including cancer (2016 *Biophysical Journal*). The mission of our group is to advance the single-molecule imaging and tracking techniques and use the enabling tools that we invent to answer the fundamental questions in biology. We are currently working towards realizing 3D single-particle tracking in tumors of live animals. In addition, we also want to directly probe the important molecular processes in live cells, such as the searching dynamics and binding kinetics of ribonucleoproteins (e.g. *Argonaute* and *Cas9*) towards their targets. Understanding how ribonucleoproteins have evolved to identify specific functional targets has great implications for the application of RNA-based systems in biotechnology and therapeutics, such as the use of miRNAs or antisense inhibitors to treat various infectious diseases, and the improvement of tools for genome editing.

For the past five years we have generated over $1.4M ($975k candidate share) in research funding from federal agencies (NIH and NSF) and private sources (Welch Foundation and Texas 4000 Foundation). Our work is highly interdisciplinary in nature and we collaborate extensively with colleagues within the Department of Biomedical Engineering at UT (Drs. Andy Dunn, Pengyu Ren and Aaron Baker), at UT MD Anderson Cancer Center (Dr. Mien-Chie Hung, vice president of basic research), and in UT Health Science Center at San Antonio (Dr. Chun-Liang Chen). We also have productive collaborations externally with researchers at Furman University (Dr. Jeff Petty) and Aarhus University (Dr. Birgitta Knudsen). These projects have resulted in 14 refereed journal articles (2 more currently under review), 30 refereed abstracts/oral presentations at conferences, 1 invention disclosure and 2 patent applications, following my joining the department. The following sections describe the details of the projects in our laboratory.

Study fundamental properties of few-atom silver nanoclusters

The ability to design and synthesize nanomaterials with specific photophysical properties is not only a great intellectual challenge, but also one with important practical consequences. To address this challenge, we are currently exploring a new class of bio-labels termed few-atom noble metal nanoclusters. Noble metal nanoclusters are collections of small numbers of gold or silver atoms (2-30 atoms) with physical sizes close to the Fermi wavelength of an electron (~0.5 nm for gold and silver). Providing the missing link between atomic and nanoparticle

behavior in noble metals, these nanoclusters have shown dramatically different optical, electronic, and chemical properties as compared to those of much larger nanoparticles or bulk materials. Among those water-soluble noble metal nanoclusters newly developed, DNA-templated silver nanoclusters (DNA/Ag NCs) have attracted great interest in biosensing owing to a number of useful photophysical and photochemical properties. For instance, controlled conversion of DNA/Ag NCs between bright and dark states by guanine proximity has led to the invention of a new molecular probe, termed a NanoCluster Beacon (NCB), that "lights up" upon binding with a DNA target (of which I am the primary developer; two US patents have been awarded to us so far). Not relying on Fŏrster energy transfer as the fluorescence on/off switching mechanism, NCBs have the potential to reach an ultrahigh signal-to-background (S/B) ratio in molecular sensing. Since the fluorescence enhancement is caused by intrinsic nucleobases, NCB detection is simple, inexpensive, and compatible with commercial DNA synthesizers.

At UT, we discovered a simple method to design NCBs with complementary emission colors, creating a set of multicolor probes for homogeneous, separation-free detection (2014 *ACS Nano*). By systematically altering the position and the number of cytosines in the cluster-nucleation sequence, we have tuned the activation colors of NCBs to green (excitation/emission: 460 nm/555 nm), yellow (525 nm/585 nm), red (580 nm/635 nm), and near-infrared (645 nm/695 nm). At the same NCB concentration, the activated yellow NCB was found to be 1.3 times brighter than the first red NCB reported in 2010. Three of the four colors (green, yellow, and red) were relatively spectrally pure. We also found that subtle changes in the linker sequence (down to the single-nucleotide level) could significantly alter the emission spectrum pattern of an NCB. When the length of linker sequences was increased, the emission peaks were found to migrate in a periodic fashion, suggesting short-range interactions between silver clusters and nucleobases. Size exclusion chromatography results indicated that the activated NCBs are more compact than their native duplex forms. Our findings demonstrate the unique photophysical properties and environmental sensitivities of few-atom DNA-templated silver clusters, which are not seen before in common organic dyes or luminescent crystals. We are currently collaborating with Dr. Jeff Petty at Furman University (one of the most important researchers in the field; this is a new collaboration formed after I joined UT) on the chemical analysis of silver clusters using a number of analytical tools (ICP-AES, MS, size-exclusion chromatography). This research is current supported by an **NSF-CHE** grant that Jeff Petty and I received together (16-19), of which I am the primary PI.

Create new fluorescent probes for a wide variety of biosensing applications

Other than the fundamental research on materials properties, we also aim to engineer silver cluster probes for a wide variety of biosensing applications. One example is the single-nucleotide polymorphism (SNP) identification. SNP can serve as biomarkers that not only reveal disease origins on the human genome map but also can be utilized for personalized medicine as they shed light on a person's potential response to a drug therapy. SNP detection typically requires enzymatic reactions that are costly and time-consuming. Non-enzymatic reactions (e.g. allele specific hybridization), however, can only differentiate one match allelic variant from three mismatch variants at a given polymorphic site (i.e. 4 SNPs classified into 2 groups). I have previously developed a new hybridization probe termed chameleon NanoCluster Beacon (cNCB) that can classify 4 allelic variants (A, C, G, T) into 3 groups by emission spectra (2012 *JACS*). There has not been a method that can differentiate all 4 SNPs in a single-pot, non-enzymatic reaction. At UT, my lab is exploring a wide variety of noncanonical nucleotide analogs (e.g. LNA monomers) that can be incorporated into our probes to achieve complete SNP discrimination. One original discovery that we have made is we found LNA thymidine monomer enables differentiation of 4 allelic variants by melting temperature (2017 *JACS*, UT invention disclosure 6897 YEH). Tailoring the affinity between strands and the cluster binding site with noncanonical nucleotides is just the first step towards our long-term goal of first-principle design of highly fluorescent, photostable and tunable silver nanocluster probes for specific biosensing applications.

Another example is we have turned DNA/Ag NCs into a new fluorescent probe specific for N6-methyladenosine (m^6A) detection (2015 *JACS*). This work came at an exciting moment when researchers just began to unveil the novel epigenetic mechanisms of m^6A in eukaryotes and pointed out the possible epigenetic regulatory roles of m^6A in human cancers. However, studying m^6A's epigenetic roles is very difficult. Unlike bacterial genomes, the level of m^6A modification in human genome is so low that the traditional methods, such as HPLC-electrospray ionization tandem mass spectrometry (HPLC-MS/MS, detection threshold around 1 m^6A out of 1 million nucleosides), are unable to detect m^6A in human DNA. Unlike 5-methylcytosine (m^5C), there is no chemical treatment that can

facilitate the m^6A detection. The unique detection tool that we have invented thus allows researchers to study m^6A's role in the control of important biological processes such as tumor cell differentiation. A US patent application has been filed by OTC (U.S. 15/231,262). This research is current supported by a **Welch Foundation** grant (13-19).

The overall goal of this research is to create the next generation fluorophores that are small, bright, photostable, nontoxic, multicolor, low-cost, activatable, and encodable. The developed fluorophores can potentially be used in the 3D single-molecule tracking project below.

Develop next-generation 3D single-molecule imaging and tracking microscopes

Imaging capability is often at the center of basic science research. For biomedical research, elucidating molecular trafficking routes within cells and tissues will lead to the understanding of the development and treatment of various diseases including cancer. However, current single-molecule tracking methods are either confined to two dimensions or limited to an interrogation depth of ~15 μm. To achieve deep and high-resolution 3D single-molecule tracking in live cells and tissues, we (together with Dr. Andy Dunn's group at UT BME) have developed a unique two-photon, 3D single-particle tracking (2P-3D-SPT) method capable of tracking individual particles at depths up to 200 μm in scattering samples with 22/90 [xy/z] nm spatial localization precision and 50 μs temporal resolution. At shallow depths the localization precision can be as good as 35 nm in all three dimensions. The approach is based on passive pulse splitters used for nonlinear microscopy to achieve spatiotemporally multiplexed 2P excitation and temporally demultiplexed detection to discern the 3D position of the particle. The z-tracking range is up to ± 50 μm (limited by the objective z-piezo stage) and the method enables simultaneous fluorescence lifetime measurements on the tracked particles. A major advantage of this method over previous tracking approaches is that it requires only one detector for 3D particle tracking and is compatible with multicolor two-photon microscopy. We have coined this technique TSUNAMI (Tracking Single particles Using Nonlinear And Multiplexed Illumination). A US patent application has been filed by OTC (UTFB.P1048WO) and this work was published in *Nature Communications* in 2015 (co-corresponding authors: Yeh and Dunn). This research is current supported by an **NIH-NCI-IMAT R21** grant that Andy Dunn and I received together (15-18), of which I am the reporting PI.

Study cell biomechanics and tumor-penetration processes of anticancer drugs using the developed imaging tool

We are using the enabling imaging tool that we have built to study the biomechanics of syndecan-1 knockout vascular smooth muscle cells (in collaboration with Dr. Baker at UT BME; a manuscript is currently under review at *Biomaterials*) and the tumor-penetration processes of anticancer drugs *in vivo* (in collaboration with Dr. Rana Ghosh at UT College of Pharmacy and Dr. Mien-Chie Hung at UT MD Anderson Cancer Center). In particular, our team (Yeh, Dunn, Ghosh, and Hung) are currently pursuing an NIH R33 grant to study the delivery processes of albumin-based drugs in pancreatic ductal adenocarcinoma (PDAC). PDAC is refractory to essentially all therapies. Gemcitabine, the standard-of-care chemotherapeutic drug, can only extend survival by a few weeks. Whereas new anticancer drugs that disrupt the stromal fortress of PDAC have been developed, we don't have a suitable *in vivo* imaging tool to monitor the penetration and distribution dynamic processes of these drugs in PDAC stroma. We propose to adapt our TSUNAMI tracking microscope to perform real-time monitoring of drug particle transport in tumors of live animals with sub-micron spatial resolution and sub-millisecond temporal resolution. The multifunctional capabilities of this system will also allow us to see the molecular interaction hotspots in the tumor microenvironment. The proposed research will lay the foundations of dynamic transport processes and distribution of therapeutic agents in tumors, leading to a fundamental understanding of the mechanisms governing therapeutic resistance. As most research focuses on enhancing drug efficacy by suppressing the cellular or genetic mechanisms of drug resistance, the role of limited and uneven drug distribution inside tumors is less appreciated. We believe that the development of new anti-PDAC drugs requires thorough understanding of their stroma penetration dynamic processes. The acquired information will certainly point out the direction of future anti-PDAC drug design.

Use molecular trajectory as a biomarker for early detection of castration resistance

Metastatic castration-resistant prostate cancer (mCRPC) is the 2nd leading cause of cancer death in men. However, mCRPC patients only account for ~35% of newly diagnosed patients – the other 65% are likely to remain indolent. Overtreatment is an issue in today's prostate cancer management since there are no effective biomarkers

that can reliably discriminate mCRPC patients from indolent patients. Collaborating with Chun-Liang Chen at UT Health Science Center at San Antonio, we propose to develop a new biomarker based on the membrane receptor dynamics in the circulating tumor cells (CTCs) collected from patients' blood. Receptor Motion pattern in prostate CTC (ReM-CTC) represents an entirely new class of biophysical markers for early prediction of castration resistance. To develop such a new biophysical marker, our group is studying the molecular dynamics of membrane receptors such as EGFR (2016 *Biophysical Journal*) and PD-1 (currently under review at *Cancer Research*, in collaboration with researchers at MDA). Our TSUNAMI tracking method is 100% compatible with current microfluidic CTC isolation platforms. Our primary targets here are membrane androgen receptor (mAR), EGFR and TGFBR2 (potent inducers of EMT). My collaborators and I will correlate EMT- and endocytosis-related "single-cell" gene expression profiles (84 genes selected) with 3D receptor motion patterns in evaluating the hypothesis of ReM-CTC biomarker. I emphasize that the combination of these two powerful techniques (single-cell gene expression and 3D single-particle tracking) has never been realized before, and, if successfully developed, will provide therapeutic options for effective intervention in future prostate cancer management. This research is currently supported by the seed fund from **Texas 4000 Foundation**. We continue to apply for NIH R01 grant to fund this research.

Develop imaging and modeling tools for studying kinetics and dynamics of regulatory RNA in live cells

While our knowledge in the regulatory functions of RNA is rapidly increasing, there are still many unanswered questions. What is the tradeoff between specificity and activity of guide RNA? Does *in vitro* profiling of off-target DNA cleavage reflect the real specificity and activity of guide RNA in live cells? What about their specificity and activity in different kinds of cells and organisms? What are differences in dynamic processes (e.g. hopping, jumping, 3D diffusion and 1D sliding) that *Argonaute* and *Cas9* system adopt to search for, and interact with, their targets sites in complex cellular environments? How does nature control specificity and activity through fine tuning of on-target binding/unbinding kinetics and off-target binding/unbinding kinetics? To answer these questions, we will need (1) an imaging tool that not only is live-cell compatible but also can measure both dynamics and kinetics of short nucleic acids (NAs) at the single-molecule level in the 3D space and (2) a model that takes all molecular crowding and protein chaperone effects into account when simulating the dynamic search processes and hybridization kinetics of NAs in a cell.

I plan to extend our current imaging capability from single molecules to whole cells by building a lattice light-sheet microscope around our existing 3D single-molecule tracking microscope, creating a unique system that will allow us to image intracellular structures at high spatiotemporal resolution. Using advanced intracellular delivery techniques, we want to deliver labeled NAs into live cells, record dynamics, measure k_{on}, k_{off} and K_a, and map these parameters to the 3D cellular images. The acquired data will help elucidate the effects of (1) excluded volume, (2) diffusivity reduction, (3) solution property change and (4) NA-protein interactions in NAs' on-target/off-target binding kinetics and target search dynamics. We hypothesize that the binding kinetics and search dynamics can be intracellular location dependent and we plan to map this relationship using the developed imaging tool. In collaboration with Dr. Pengyu Ren at UT BME, we also want to develop a Brownian dynamics simulation model to understand the molecular crowding and protein chaperone effects on the structures, interactions, and functions of NAs. This integrated research will shed light on (1) new regulatory functions of small NAs and (2) cells' response to a certain stimulus. Our team (Yeh and Ren) will establish both novel experimental techniques to acquire improved thermodynamic parameters and novel algorithmic methods to convert these parameters into real predictions of hybridization kinetics *in vivo*, which in turn can be experimentally tested for correctness. Thus by combining experimental and computational approaches, we will move through the design-experiment-feedback cycle with unparalleled speed and accuracy. The broader impact of this research is that not only the NA hybridization, other molecular interactions or transformation kinetics, such as protein binding and protein folding, can also be probed inside live cells using the developed tools. In addition, understanding how ribonucleoprotein systems have evolved to identify specific functional targets has great implications for the application of NA-based systems in biotechnology and therapeutics, such as the use of miRNAs or antisense inhibitors to treat various non-communicable and infectious diseases, and the improvement of tools for genome editing. Dr. Ren and I currently have an R01 proposal under review at NIGMS. I also plan to submit grant applications to NCI-IMAT R33 and DOD-CDMRP programs.

Candidate's Summary on Research

(in rank for assistant professors; since last promotion review for associate professors)

Table 1. Research Summary

Metric	Value
Peer-reviewed journal publications (in rank and total)	14 / 33
Peer-reviewed conference proceedings (in rank and total)	4 / 14
Number of journal papers in rank with supervised student(s) from UT as co-author	14
Total citations of all publications (career) from ISI Web of Knowledge	1886
h-index (career) from ISI Web of Knowledge	16
Total citations of all publications (career) from Google Scholar or Publish or Perish	2603
h-index (career) from Google Scholar or Publish or Perish	20
Total external research funding raised in rank	$1.405M
Total external research funding raised in rank (candidate's share)	$0.975M
Total number of external grants/contracts awarded in rank	5
Number of external grants/contracts awarded in rank as PI	5

Table 2. External Grants and Contracts Awarded

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI Co-PI: Andrew Dunn, BME Co-I: Mien-Chie Hung, UT MD Anderson Cancer Center	An integrated imaging tool for probing EGFR subcellular trafficking in real time	NIH-NCI	$430k	$250k	6/1/15-5/31/18
PI Co-PI: Jeffrey Petty, Chemistry, Furman University	Engineering silver clusters for molecular measurement	NSF-CHE	$550k	$300k	7/1/16-6/30/19
PI	NanoCluster Beacons for highly specific DNA methylation detection	Welch Foundation	$375k	$375k	6/1/13-5/31/19
PI	An integrated tool for probing receptor trafficking and signaling in cancer cells	Texas 4000 Foundation	$25k	$25k	9/1/14-8/31/15
PI	Molecular trajectory as a biomarker for early detection of castration resistance	Texas 4000 Foundation	$25k	$25k	2/17/17-2/16/18
TOTAL			$1.405M	$0.975M	

Notes:

(1) For all projects, list the role of the candidate.

(2) For projects with co-investigators, also list name, role (PI or Co-PI), and department (university if not UT) for each co-investigator.

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ResearcherID: M-8992-2017
Other Names: Tim Yeh
URL: http://www.researcherid.com/rid/M-8992-2017
Subject: Biophysics; Chemistry
Keywords: nanosensing; nanobiosensors; biomedical engineeering; single-molecule biophysics; single-molecule detection; super-resolution microscopy

My URLs: http://research.engr.utexas.edu/yeh/

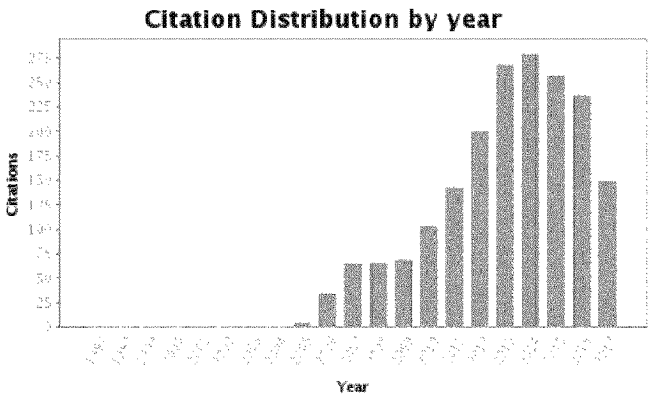
My Institutions (more details)
Primary Institution: University of Texas at Austin
Sub-org/Dept:
Role: Faculty

Publication Groups

Publication List 1 (49)
View Publications
Citation Metrics

Publication List 1: Citation Metrics

This graph shows the number of times the articles on the publication list have been cited in each of the last 20 years.
Note: Only articles from Web of Science Core Collection with citation data are included in the calculations. More information about these data.



Total Articles in Publication List: **49**
Articles With Citation Data: **35**
Sum of the Times Cited: **1886**
Average Citations per Article: **53.89**
h-index: **16**
Last Updated: **08/10/2017 00:21 GMT**

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ResearcherID: M-8992-2017
Other Names: Tim Yeh
URL: http://www.researcherid.com/rid/M-8992-2017
Subject: Biophysics; Chemistry
Keywords: nanosensing; nanobiosensors; biomedical engineeering; single-molecule biophysics; single-molecule detection; super-resolution microscopy

My URLs: http://research.engr.utexas.edu/yeh/

My Institutions (more details)
Primary Institution: University of Texas at Austin
Sub-org/Dept:
Role: Faculty

Publication Groups

Publication List 1 (49)
View Publications
Citation Metrics

Publication List 1: View

This list contains papers that I find interesting.

Sort by: Publication Year
49 publication(s) Page 1 of 5 Go
Results per page: 10

1. **Title:** 3D single-molecule tracking enables direct hybridization kinetics measurement in solution — added 09-Aug-17
Author(s): Liu, Cong; Obliosca, Judy M.; Liu, Yen-Liang; et al.
Source: Nanoscale **Volume:** 9 **Issue:** 17 **Pages:** 5664-5670 **Published:** MAY 7 2017
Times Cited: 0
DOI: 10.1039/c7nr01369h

2. **Title:** LNA Thymidine Monomer Enables Differentiation of the Four Single-Nucleotide Variants by Melting Temperature — added 09-Aug-17
Author(s): Obliosca, Judy M.; Cheng, Sara Y.; Chen, Yu-An; et al.
Source: Journal of the American Chemical Society **Volume:** 139 **Issue:** 20 **Pages:** 7110-7116 **Published:** MAY 24 2017
Times Cited: 1
DOI: 10.1021/jacs.7b03395

3. **Title:** Quantification of Rare Single-Molecule Species Based on Fluorescence Lifetime — added 09-Aug-17
Author(s): Liu, Cong; Rastogi, Ajay; Yeh, Hsin-Chih
Source: Analytical Chemistry **Volume:** 89 **Issue:** 9 **Pages:** 4772-4775 **Published:** MAY 2 2017
Times Cited: 0
DOI: 10.1021/acs.analchem.7b00397

4. **Title:** Compositions and methods for detecting single nucleotide polymorphisms — added 09-Aug-17
Patent Assignee: Google Patents
Inventor(s): Yeh, Hsin-chih; Werner, James; Martinez, Jennifer S.

5. **Title:** Deep in vivo two-photon microscopy with a low cost custom built mode-locked 1060 nm fiber laser — added 09-Aug-17
Author(s): Perillo, Evan P.; McCracken, Justin E.; Fernee, Daniel C.; et al.
Source: Biomedical Optics Express **Volume:** 7 **Issue:** 2 **Pages:** 324-334 **Published:** FEB 1 2016
Times Cited: 10
DOI: 10.1364/BOE.7.000324

6. **Title:** Metal nanocluster beacons for detection of epigentic modifications — added 09-Aug-17
Patent Assignee: Google Patents
Inventor(s): Yeh, Hsin-chih; Obliosca, Judy M.; Chen, Yu-An; et al.

7. **Title:** Segmentation of 3D Trajectories Acquired by TSUNAMI Microscope: An Application to EGFR Trafficking — added 09-Aug-17
Author(s): Liu, Yen-Liang; Perillo, Evan P.; Liu, Cong; et al.
Source: Biophysical Journal **Volume:** 111 **Issue:** 10 **Pages:** 2214-2227 **Published:** NOV 15 2016
Times Cited: 1
DOI: 10.1016/j.bpj.2016.09.041

8. **Title:** Single-molecule tracking and its application in biomolecular binding detection — added 09-Aug-17
Author(s): Liu, Cong; Liu, Yen-Liang; Perillo, Evan P.; et al.
Source: IEEE Journal of Selected Topics in Quantum Electronics **Volume:** 22 **Pages:** 64-76 **Published:** 2016
DOI: 10.1109/JSTQE.2016.2568160 / **Author-provided URL :**

9. **Title:** Single-Molecule Tracking and Its Application in Biomolecular Binding Detection. — added 09-Aug-17
Author(s): Liu, Cong; Liu, Yen-Liang; Perillo, Evan P; et al.
Source: IEEE journal of selected topics in quantum electronics : a publication of the IEEE Lasers and Electro-optics Society **Volume:** 22 **Issue:** 4 **Published:** 2016 Jul-Aug

10. **Title:** Deep and high-resolution three-dimensional tracking of single particles using nonlinear and multiplexed illumination — added 09-Aug-17
Author(s): Perillo, Evan P.; Liu, Yen-Liang; Khang Huynh; et al.

Source: Nature Communications **Volume:** 6 **Published:** JUL 2015
Times Cited: 12
DOI: 10.1038/ncomms8874

Tim Yeh (Hsin-Chih Yeh)

Biomedical Engineering, University of Texas at Austin
Nanobiosensor development, Single-molecule detection

Google Scholar

Citation indices	All	Since 2012
Citations	2603	1849
h-index	20	17
i10-index	28	21

Title 1–20	Cited by	Year
Single-quantum-dot-based DNA nanosensor Z Chun-Yang, HC Yeh, MT Kuroki, TH Wang Nature materials 4 (11), 826	826	2005
A DNA− Silver nanocluster probe that fluoresces upon hybridization HC Yeh, J Sharma, JJ Han, JS Martinez, JH Werner Nano letters 10 (8), 3106-3110	346	2010
A complementary palette of fluorescent silver nanoclusters J Sharma, HC Yeh, H Yoo, JH Werner, JS Martinez Chemical Communications 46 (19), 3280-3282	205	2010
Silver nanocluster aptamers: in situ generation of intrinsically fluorescent recognition ligands for protein detection J Sharma, HC Yeh, H Yoo, JH Werner, JS Martinez Chemical Communications 47 (8), 2294-2296	178	2011
A fluorescence light-up Ag nanocluster probe that discriminates single-nucleotide variants by emission color HC Yeh, J Sharma, IM Shih, DM Vu, JS Martinez, JH Werner Journal of the American Chemical Society 134 (28), 11550-11558	139	2012
Homogeneous point mutation detection by quantum dot-mediated two-color fluorescence coincidence analysis HC Yeh, YP Ho, IM Shih, TH Wang Nucleic Acids Research 34 (5), e35-e35	85	2006
A DNA-templated fluorescent silver nanocluster with enhanced stability J Sharma, RC Rocha, ML Phipps, HC Yeh, KA Balatsky, DM Vu, ... Nanoscale 4 (14), 4107-4110	83	2012
Formation and stabilization of fluorescent gold nanoclusters using small molecules Y Bao, HC Yeh, C Zhong, SA Ivanov, JK Sharma, ML Neidig, DM Vu, ... The Journal of Physical Chemistry C 114 (38), 15879-15882	68	2010
Fluorescent silver nanoclusters as DNA probes JM Obliosca, C Liu, HC Yeh Nanoscale 5 (18), 8443-8461	64	2013
Ag K-edge EXAFS analysis of DNA-templated fluorescent silver nanoclusters: insight into the structural origins of emission tuning by DNA	56	2011

Title 1–20	Cited by	Year
sequence variations ML Neidig, J Sharma, HC Yeh, JS Martinez, SD Conradson, AP Shreve Journal of the American Chemical Society 133 (31), 11837-11839		
MEMS device with two axes comb drive actuators J Gritters, CA Bang, E Klaassen, L Fan, R Chen, H Yeh, EJJ Kruglick US Patent 7,872,394	54	2011
Quantum dot–mediated biosensing assays for specific nucleic acid detection HC Yeh, YP Ho, TH Wang Nanomedicine: Nanotechnology, Biology and Medicine 1 (2), 115-121	52	2005
DNA/RNA detection using DNA-templated few-atom silver nanoclusters JM Obliosca, C Liu, RA Batson, MC Babin, JH Werner, HC Yeh Biosensors 3 (2), 185-200	45	2013
Digital MEMS switch for planar photonic crossconnects L Fan, S Gloeckner, PD Dobblelaere, S Patra, D Reiley, C King, T Yeh, ... Optical Fiber Communication Conference, TuO4	40	2002
Single-molecule detection and probe strategies for rapid and ultrasensitive genomic detection HC Yeh, SY Chao, YP Ho, TH Wang Current pharmaceutical biotechnology 6 (6), 453-461	36	2005
Bright two-photon emission and ultra-fast relaxation dynamics in a DNA-templated nanocluster investigated by ultra-fast spectroscopy SH Yau, N Abeyasinghe, M Orr, L Upton, O Varnavski, JH Werner, ... Nanoscale 4 (14), 4247-4254	32	2012
A complementary palette of NanoCluster Beacons JM Obliosca, MC Babin, C Liu, YL Liu, YA Chen, RA Batson, M Ganguly, ... ACS nano 8 (10), 10150-10160	29	2014
Coupling confocal fluorescence detection and recirculating microfluidic control for single particle analysis in discrete nanoliter volumes CM Puleo, HC Yeh, KJ Liu, TH Wang Lab on a Chip 8 (5), 822-825	28	2008
A microfluidic-FCS platform for investigation on the dissociation of Sp1-DNA complex by doxorubicin HC Yeh, CM Puleo, TC Lim, YP Ho, PE Giza, RCC Huang, TH Wang Nucleic acids research 34 (21), e144-e144	26	2006
Applications of MEMS technologies in tissue engineering CM Puleo, HC Yeh, TH Wang Tissue engineering 13 (12), 2839-2854	22	2007

Dates and citation counts are estimated and are determined automatically by a computer program.

Budget Council Member Statement

Academic Advising, Counseling and other Student Services

Name of Candidate: Hsin-Chih (Tim) Yeh

Name of Budget Council Member: Kenneth R. Diller

Signature: 

Dr. Yeh has focused his academic advising, counseling and other student services on three activity areas: undergraduate student mentoring; graduate student mentoring, and student organization faculty sponsorship. These areas will be discussed individually.

Mentoring of Undergraduate Students

Dr. Yeh has recruited and mentored a substantial number (20) of undergraduate students to join his laboratory while he has been in rank as an Assistant Professor. He has placed these students in positions of genuine responsibility, such that some earn authorship on peer reviewed papers (6) and have won awards and fellowships (9). Many have moved on to post graduate positions at other strong academic institutions. Dr. Yeh takes an active personal role in advising these students professionally.

Mentoring of Graduate Students

As with undergraduates, Dr. Yeh's focus in this arena is centered around his research lab. He has graduated three Ph.D. students, two of whom were co-supervised (one of which was previously Dr. John Zhang's student whom Dr. Yeh inherited when Dr. Zhang departed for Dartmouth). He currently has two Ph.D. students, one of whom has qualified. One student graduated in 2014 and has a postdoc at the University of Arizona. The other two are just recent May, 2017 graduates. Dr. Yeh's graduate students have the characteristics of strong mentoring, such as paper co-authorship and winning competitive national level awards. It appears that his graduate students are being well prepared to move on to productive independent careers. He has supervised one postdoctoral fellow, Dr. Judy Obliosca who is now a Research Scientist in Industry at Luna Innovations Incorporated.

Sponsorship of Student Organizations

Dr. Yeh is a faculty sponsor to two student organizations: Travis Christian Assembly Chinese Campus Fellowship and Taiwanese Student Association. He takes an active role in both organizations, attending weekly meetings, making formal presentations, and providing personal advice to students.

Summary and Analysis of Academic Advising, Counseling and other Student Service Contributions by Dr. Yeh

Dr. Yeh has compiled a sound record of advising and student service while in his current rank of Assistant Professor. He is very engaged with both undergraduate and graduate students and student organizations. His record of advising and student service is about average for BME faculty and is consistent with promotion.

Candidate's Summary of Advising, Counseling, and Other Student Services

Name of Candidate: Hsin-Chih (Tim) Yeh

Table 1. Summary of Academic Advising

Metric	Value
Student organizations advised	2 (TCACF and TSA)
Undergraduate researchers supervised	20
PhD students completed *	2 (1)
MS students completed *	0 (0)
PhD students in pipeline (as of 09/2017)*	2 (2)
MS students in pipeline (as of 09/2017)*	0 (0)

Notes:

* Count student as 1.0 if candidate is the sole advisor, count student as 0.5 if the student is co-advised.

Table 2. Degrees Conferred to Graduate Students Supervised

Student Name	Co-Supervisor	Degree	Start Date	Graduation Date	Placement
Cong Liu		PhD	09/2012	05/2017	Engineer in ASML, Inc.
Evan Perillo	Andy Dunn	PhD	09/2012	05/2017	Postdoc at Los Alamos National Lab
Peng Chen	John Zhang	PhD	03/2014	08/2014	Postdoc in the Center for Nanobioscience and Medicine at University of Arizona

My advising, counseling and other student services at UT Austin in the past 5 years are focused on three areas – graduate advising, undergraduate advising and student organization advising. The detailed activities in each category are listed below.

Graduate Advising:

The first two PhD students Cong Liu and Evan Perillo (co-advised with Andy Dunn) have both graduated in Spring 2017. In the past 5 years they were very productive and received comprehensive training in advanced microscopy and single-molecule biophysics. Cong Liu gave four oral presentations at *SPIE Photonics West*, *BMES*, *IEEE-NEMS* and *BPS* conferences. Evan Perillo gave three oral presentations at *SPIE Photonics West* and *BMES* conferences. Cong Liu published first-author journal articles in *Analytical Chemistry*, *Nanoscale*, *Applied Physics Letters*, and *IEEE Journal of Selected Topics in Quantum Electronics*, while Evan Perillo published first-author journal articles in *Nature Communications*, *Light: Sciences & Applications*, and *Biomedical Optics Express* (I am the co-corresponding author on the *Nature Communications* paper and the coauthor on the other two papers). In particular, Evan Perillo won the *PicoQuant Young Investigator Award* in the Single-Molecule Spectroscopy and Imaging session at the SPIE Photonics West BiOS conference in 2015. He also won the *GS University Graduate Continuing Fellowship* in 2016. Cong Liu was recognized by the *George J. Heuer, Jr. Ph.D. Endowed Graduate Fellowship* in 2015. Cong and Evan were co-inventors on two separated patent applications (U.S. 15/231,262 and WO/2016/126250).

Cong Liu was an intern at Cairn Research in UK in summer 2016 and Evan Perillo worked at Center for Integrated Nanotechnologies in Los Alamos National Laboratory in summer 2013. Evan's summer externship was required by his T32 fellowship. Using my connections at Los Alamos National Laboratory (where I did my postdoc from 09-12), I sent Evan to work at LANL in summer 2013. This summer working experience has successfully secured Evan a postdoc position at LANL after graduating from UT. Cong is now working at ASML, a manufacturer for photolithography systems in Connecticut.

Peng Chen was originally advised by John Zhang, who moved from UT to Dartmouth in 2014. Peng was left at UT to finish his dissertation – that is how I became Peng's co-advisor. Peng completed and defended his dissertation in summer 2014. Now he works as a postdoc in the Center for Nanobioscience and Medicine at University of Arizona.

I currently have two PhD students (one in candidacy). Yen-Liang Liu is a 5th year PhD student who is expected to graduate in summer 2018. Yen-Liang has already published first author journal articles in *Applied Physics Letters* (co-first author) and *Biophysical Journal*. Yuan-I Chen is in her 2nd year at UT. Both Yen-Liang and Yuan-I won Study Abroad Scholarship from Ministry of Education in Taiwan ($32,000 for 2 years).

Among the 4 PhD students, Evan Perillo and Yen-Liang Liu were actively involved in the student organization BOGO (Biomedical Optics Graduate Organization).

I have served or am serving on 14 additional PhD dissertation committees. The list below summarizes my graduate advising activities:

PhD students completed:

Cong Liu	BME	2012-2017
Evan Perillo (co-advised)	BME	2012-2017
Peng Chen (co-advised)	BME	2014-2014

PhD students in progress:

In candidacy:

Yen-Liang Liu	BME	2013-

Preparing for BME dissertation proposal:

Yuan-I Chen	BME	2016-

T32 student co-advising:

Chris Martin	BME	2013

Rotation student advising:

Ahmed Hassan	BME	2015
Junyan Liu	BME	2016
Chengyue Wu	BME	2016
Hanlin Zhu	BME	2016

Graduate student awards:

Cong Liu	2015	George J. Heuer, Jr. Ph.D. Endowed Graduate Fellowship
Evan Perillo	2015	PicoQuant Young Investigator Award
Evan Perillo	2016	GS University Graduate Continuing Fellowship
Yen-Liang Liu	2015	Biophysics society annual meeting travel award ($300)
Yen-Liang Liu	2015	NATEA-Dallas Scholarship ($100)
Yen-Liang Liu	2016	Study Abroad Scholarship from Ministry of Education in Taiwan ($32k)
Yen-Liang Liu	2017	Single-cell biophysics symposium travel award ($1000)

Yuan-I Chen	2017	Study Abroad Scholarship from Ministry of Education in Taiwan ($32k)
Yuan-I Chen	2017	Travel grant from Cockrell School of Engineering ($500)
Yuan-I Chen	2017	Travel award from the 2017 q-bio summer school

Dissertation committees:

Stephanie Steichen	BME	2013-2016
Donald Robinson	Chemistry	2014-2016
Avinash Gadok	BME	2015-2017
Bharadwaj Muralidharan	ECE	2014-
Hai Yan	ECE	2016-2017
David Miller	BME	2016-
Amey Puranik	ChE	2012-2015
Christian Schrandt	BME	2013-2015
Bin Yang	BME	2014-2015
Brandon Slaughter	BME	2013-2013
Youngkyu Lee	ECE	2013-2014
Chun-Hsien Wu	BME	2013-2014
Gauri Bhave	BME	2014-2014
Xiaojia Mu	BME	2014-2014

Undergraduate Advising:

I have advised or am advising 20 undergraduate students since 2012. These undergraduates have become an important component in our vibrant and productive research. While I do not take as many undergraduate research assistants as my colleagues do, we have created a win-win working environment for most of our undergraduate students. That is, while undergraduate students help us move our research forward, we help them become co-authors of our peered reviewed articles, present research results at national conferences, compete for undergraduate research fellowships, and participate in poster competitions. We also prepare them for job interviews or design competitions at the national level. My five-year experience in industry and eleven-year experiences with three young laboratories are the best assets for me to advise these undergraduate students. Many of them continue to pursue an advanced degree after graduation. These students have found their passions in specific topics and are ready to take bigger challenges in their professional lives. I have also served as the faculty advisor for two senior design teams working on projects sponsored by private sectors. The list below summarizes my undergraduate advising activities:

Undergraduate advising and associated awards:

1. Austin Batson	BME	9/12-5/14	○ 1st place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2013. ○ Co-author on a 2013 *Biosensors* article.
2. Mark Babin	Chemistry	1/13-8/14	○ Co-author on a 2013 *Biosensors* article. ○ Co-first author on a 2014 *ACS Nano* article.
3. Quincy Zhuang	BME	2/14-5/15	○ Co-author on a 2014 *IEEE-NEMS* conference proceeding.
4. Anthony Hsu	BME	6/13-5/15	
5. Ben Hoang	BME	2/14-8/15	○ Undergraduate Research Fellowship ($1000), 2014.
6. Mohammad Syed	BME	1/15-5/15	

7.	Kevin Varghese	BME	8/14-5/16	○ Undergraduate Research Fellowship ($1000), 2014.
8.	Peter Yu	BME	2/14-5/16	○ Undergraduate Research Fellowship ($1000), 2014 and 2015. ○ 3rd place at the National Institutes of Health's Design by Biomedical Undergraduate Teams (DEBUT) Challenge, 2015. ○ 1st place at the Engineering World Health Annual Design Competition, 2015 ○ Co-author on a 2016 *Biophysical Journal* article. ○ Poster presentation at 2014 BMES conference.
9.	Mary Gwozdz	BME	6/15-5/16	○ Undergraduate Research Fellowship ($1000), 2015. ○ Co-author on a 2015 *JACS* article.
10.	Hannah Horng	U. of Maryland	6/16-8/16	
11.	Darren Imphean	BME	6/14-5/17	○ Undergraduate Research Fellowship ($1000), 2014 and 2015. ○ 1st place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2015. ○ 2nd place at the 2015 Spring BME Undergraduate Research Poster Competition, 2015. ○ Co-author on a 2015 *Nanoscale* article. ○ Co-author on a 2017 *JACS* article. ○ Oral presentation at 2014 BMES conference.
12.	Ajay Rastogi	BME	6/15-5/17	○ 3rd place at the National Institutes of Health's Design by Biomedical Undergraduate Teams (DEBUT) Challenge, 2015. ○ 1st place at the Engineering World Health Annual Design Competition, 2015. ○ Co-author on a 2017 *Analytical Chemistry* article.
13.	Sunny Kim	BME	1/16-	
14.	Rohan Vasisht	BME	1/16-5/17	○ 3rd place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2017. ○ Undergraduate Research Fellowship ($1000), 2017.
15.	Karena Yu	BME	1/16-5/17	○ Undergraduate Research Fellowship ($1000), 2016.
16.	Sahana Krishnan	ECE	1/16-5/17	
17.	Stephanie Phillion	BME	6/17-	
18.	Phyllis Ang	BME	6/17-	
19.	Jillian Ortner	Georgia Tech	6/17-8/17	
20.	Guillermo Beckmann	UT El Paso	6/17-8/17	

<u>Senior design team (BME 371) advising</u>:

1.	Team 17	2015	Gio Campagna and three other students
2.	Team 14	2016	Keerti Kalra, Kevin Varghese, Ahlam Qerqez, Sharwin Khot

Student Organization Advising:

I participate in two student organizations since I joined UT in 2012. The first one is the TCACF – Travis Christian Assembly Chinese Campus Fellowship (https://www.facebook.com/tcacf/). It is a Chinese Christian Fellowship led by ECE Professor Ray Chen. We gather every Friday night in SAC for Bible study and coordinate welcome events for newly arrived UT Chinese students. The other UT student organization that I am involved is the TSA – Taiwanese Student Association at the University of Texas at Austin (https://www.facebook.com/groups/185901551529428/). I attend TSA welcome events and give a general introduction to UT. I also provide career advising seminars to newly arrived Taiwanese students (on 2/20/2015 and 2/18/2016). The list below summarizes other student organization service activities:

Speaker and panelist at student organizations:

1.	Texas 4000	4/20/2015
2.	SASE South Central Regional Conference	3/28/2015
3.	Graduate Engineering Council	10/28/2015

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Biomedical Engineering • 107 W Dean Keeton, Stop C0800 • Austin, Texas 78712
(512) 471-3604 • FAX (512) 471-0616

Department of Biomedical Engineering Budget Council Statement Service to the University and to the Nation, State and Community

Candidate: Dr. Hsin-Chih "Tim" Yeh

Name of Budget Council Member: Michael S. Sacks

Signature: 

The review of Dr. Yeh's service record was conducted by examining documents that the candidate provided to the budget council. He has served on *six* departmental committees. I have served with him on the GSC executive committee and can attest to his enthusiastic and dedicated participation. He has also served on a variety of student service committees and as a judge (12 total). He relates very well with the students and provides a communication bridge that is sometimes lacking in more senior colleagues.

At the Cockrell School level, Dr. Yeh embraced the request to serve on an Ad Hoc Math Curriculum committee since 2013. He has made some significant assessments and improvements to the entire school's approach to our undergraduate math curriculum and has served as an important liaison to our undergraduate curriculum committee relative to those decisions and processes.

He has been a strong service mentor to student organizations within the University, too; he participates in both the Taiwanese Student Association (UT-Austin chapter) and the Travis County Christian Assembly Chinese Campus Fellowship (TCACF). Specifically, he participates in welcome events and career advising seminars for these students, especially focused on welcoming newly arrived students from China and Taiwan to Austin and UT.

His service outside The University has also been noteworthy. Dr. Yeh has served on two Federal Funding Agency committees (for National Science Foundation), and has been very active as a Journal reviewer, for publications such as *Nature Methods*, *Nature Communications*, *Nanoscale,* and *Analytical Chemistry*.

In summary, Dr. Yeh has demonstrated substantial service to The University, nation, state, and professional community that clearly meets the expectations for the promotion of an assistant professor to associate professor.

Candidate's Statement: Service to the University and to the Nation, State and Local Community

Name of Candidate: Hsin-Chih (Tim) Yeh

Service to the University

In the past 5 years I have been actively involved in a number of committees to the Department of Biomedical Engineering and the Cockrell School of Engineering. In particular, I have become a member of BME Graduate Studies Council Executive Committee since 2015. While serving on the GSC Executive Committee, we defined the BME MS program curriculum for the Dell Medical School students and reformulated rotation program for the first-year PhD students. I have learned much from my service on the GSC Executive Committee and understood that our first priority is always on students' overall well-being. In Spring 2017 I noticed the programming capabilities of our BME sophomore students significantly declined due to the removal of a programming core course (EE319K) in the previous year. We did not have a plan to make up that knowledge vacuum and the students were struggling in my class. I immediately reported this issue to the Undergraduate Curriculum Committee (although I am not serving on it) and was involved in discussion to modify the BME303 and BME214L class contents to better prepare our BME students before coming to my BME313L class.

In 2013-2014 I was selected as the Departmental Representative to serve on the Cockrell School of Engineering Ad Hoc Math Curriculum Committee led by ME Professor Desiderio Kovar. Desiderio noticed three issues in our engineering school math curriculum – high Q-drop/failure rate, inadequate training on some specific topics, and inefficient curriculum design. As math is the most important training for engineering students and clearly our peer universities have done better than us in math teaching, Desiderio convinced the Dean to put together an Ad Hoc Math Curriculum Committee to fix the issues. It was a challenging task due to the multi-facet nature of the disciplines in the 7 engineering departments. But after one year of effort, we successfully simplified and streamlined the match curriculum, and added the missing components to the required classes. The new curriculum was implemented in 2015. This year Desiderio called the Ad Hoc Committee members to meet again to evaluate the outcomes of the new curriculum. We clearly have met our target in reducing the Q-drop/failure rate, but classes such as 408D still cover too many materials and require future simplification. I continue to discuss the issues with other departmental representatives and the math department representatives, aiming to design the best curriculum to train the 21st century engineers. My services on various committees are summarized below:

Department Committee Assignments:

- BME Award Committee, 2013-present
- BME Faculty Search Committee, 2013-2014
- BME Graduate Studies Council Executive Committee, 2015-present
- BME Seminar Committee, 2015-present
- Chair of the BME International Graduate Admissions Committee, 2015
- International Graduate Admissions Committee, 2016-present

Cockrell School of Engineering Committee Assignments:

- CSE Ad Hoc Math Curriculum Committee, 2017-present
- CSE Ad Hoc Math Curriculum Committee, 2013-2014

University Committee Assignments:

None

Service to Student Organizations or Events:

I participate in two student organizations since I joined UT in 2012. The first one is the TCACF – Travis Christian Assembly Chinese Campus Fellowship (https://www.facebook.com/tcacf/). It is a Chinese Christian Fellowship led by ECE Professor Ray Chen. We gather every Friday night in SAC for Bible study and coordinate welcome events for newly arrived UT Chinese students. The other UT student organization that I am involved is the TSA – Taiwanese Student Association at the University of Texas at Austin (https://www.facebook.com/groups/185901551529428/). I attend TSA welcome events and give a general introduction to UT. I also provide career advising seminars to newly arrived Taiwanese students (on 2/20/2015 and 2/18/2016). The list below summarizes other student event service activities:

1. Judge for BME Design Competition (4/1/2017)
2. Judge for the poster session at the Graduate and Industry Networking (GAIN) event (1/29/2014, 1/31/2017)
3. Judge for the Cockrell School Poster Exhibition on Engineering Research (PEER) (4/19/2013, 4/9/2014, 4/21/2015)
4. Speaker for BME first-year interest group (FIG) (11/21/2016)
5. Speaker for professional development seminar for BME graduate students and postdocs (T32 program) (5/3/2016)
6. Reviewer for Undergraduate Research Fellowship (URF) applications (2013-present)
7. Speaker at Women Engineering Program (7/29/2014)
8. Speaker at Texas 4000 general meeting (4/20/2015)
9. Panelist at Graduate Engineering Council Career Panel (10/28/2015)
10. Panelist in the SASE South Central Regional Conference on UT campus (3/28/2015)
11. Speaker at UT Taiwanese Student Association (2/20/2015 and 2/18/2016)
12. Speaker at the UT Pan American student campus visiting event (4/5/2013)

Service to the Nation, State and Local Community

I have been involved in service to Nation, State and Local Community through participating in professional societies, organizing conference sessions, reviewing articles for leading journals, reviewing grants, presenting my research to local boy scouts or high student students, serving as a panelist at career advising events, and guiding high school students to visit our labs in the BME department at UT.

Professional Society/Conference (Symposium) Organization:

1. Session organizing chair and technical program committee, IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2017): Emerging Micro- and Nano-Scale Sensing and Manipulation Techniques (4/10/2017).
2. Session chair, IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2017): Nanomaterials II (4/11/2017).
3. Session organizing chair and technical program committee, IEEE International Conference on Nano/Molecular Medicine & Engineering (IEEE-NANOMED 2015): Detection, Delivery and Microscopy in Single Cells (11/17/2015).
4. Session chair, IEEE International Conference on Nano/Molecular Medicine & Engineering (IEEE-NANOMED 2015): Innovative Optical Sensing Technologies for Biomedical Diagnosis (11/17/2015).
5. Session chair, Biomedical Engineering Society Conference (BMES 2015): Optical Imaging III: Microscopy Advances (10/10/2015).

Review Committees:

1. National Science Foundation, ECCS Division, Grant Review Committee for CCSS program (3/4-3/5/2013).
2. Journal Peer Review: *Nature Methods, Nature Communications, Light: Science & Applications, Analytical Chemistry, Chemical Communications, ACS Nano, Lab on a Chip, Biosensors and Bioelectronics, Nanoscale, Journal of Materials Chemistry B, ACS Applied Materials & Interfaces, Journal of Colloid & Interface Science, Nano LIFE*.

Local Communities:

1. Speaker for Wolf Boy Scouts (Den 10, Pack 371) at Patsy Sommer Elementary School (9/20/2016)
2. Presenter at the STEAM Festival at Bastrop High School (1/23/2014)
3. Speaker at St. Dominic Savio Catholic High School (2/18/2014)
4. Panelist for discussion to promote STEM education at St. Dominic Savio Catholic High School (2/20/2014)
5. Guide to local high school students to visit our BME labs (05/16/2013 and 01/28/2015).

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Department of Biomedical Engineering Budget Council Statement on Honors and other Evidence of Merit or Recognition, Including Contracts and Grants

Candidate Name: Hsin-Chih "Tim" Yeh

Prepared by: Laura J. Suggs

Preparer Signature:

Dr. Suggs was appointed by Professor Shelly Sakiyama-Elbert, Chair of the Department of Biomedical Engineering to evaluate Professor Yeh's record of contributions to Honors and Merit Recognition.

Dr. Yeh has been broadly recognized as a leader in the development of probes and microscopy techniques that push the boundaries of subcellular resolution and three-dimensional imaging. Dr. Yeh has received monetary awards from multiple federal, state and local sources. This diverse recognition speaks to Dr. Yeh's ability to establish a robust research program here at UT Austin. As a result, he has been invited to speak at prestigious venues both nationally and internationally. Dr. Yeh is also one of the most dedicated educators within the BME Department. He has been awarded an Outstanding Faculty Award and has mentored his students towards academic and scientific success.

In the last few years, Dr. Yeh has been honored for his innovative research. In 2014, Dr. Yeh was awarded the Welch Foundation Grant to develop his NanoCluster Beacons for detection of DNA methylation. In the same year, this breakthrough received the Los Alamos National Laboratory Postdoctoral Publication Prize in Experimental Sciences. In 2015 and again in 2017, Dr. Yeh received grants from the Texas 4000 Foundation. This award is particularly meaningful as it is money raised individually by UT students during their summer ride from Austin to Alaska. In 2015, Dr. Yeh received support from the NIH National Cancer Institute to develop an imaging tool to track EGF receptor kinetics. In 2016, Dr. Yeh received funding from the National Science Foundation to develop silver nanoclusters for molecular measurement. These awards at the local, state and national levels represent broad recognition of Dr. Yeh's scientific accomplishments and current impact on the field.

Dr. Yeh is highly sought after as a speaker both within the US and abroad. He has given numerous talks in 2017 and 2016 in Taiwan. He has also been invited to give talks at prestigious peer institutions such as Rice University (2017), the University of Minnesota (2017), Johns Hopkins University (2016), University of Pennsylvania (2016), UCLA (2016) and Columbia (2016). He has also given talks in Denmark in 2016 as well as at Los Alamos National Labs (2013) to receive his Postdoctoral Publication Prize. He has presented ground-breaking work on nano-cluster imaging beacons as well as his more recent work on 3D super-resolution microscopes. These types of imaging probes and microscopy techniques are in high demand across a number of biotechnology fields.

The award for which Dr. Yeh is particularly proud is the 2016 Outstanding Faculty Award for the BME department from the Student Engineering Council. This honor is based solely upon student feedback and is emblematic of the kind of devotion to the students that Dr. Yeh exhibits. Other evidence of Dr Yeh's commitment to students is the avalanche of awards received by his students. He has mentored them to

receive travel awards, poster awards, graduate fellowships, undergraduate fellowships, publication awards, etc. Awards to Dr. Yeh's students have been made at the department, college, university and national levels. Again, this is reflective of Dr. Yeh's genuine dedication to students at both the graduate and undergraduate ranks.

Dr. Yeh is a nationally and internationally recognized scientist developing molecular and microscopy tools to image events in 3D and at the subcellular level. He has received awards from national funding agencies as well as scientific foundations. He is in high demand as a speaker on these topics at scientific conferences and by special invitation. He has also been awarded for his deep commitment towards the development of the world's next generation of engineers.

Candidate's Statement: Honors and other Evidence of Merit or Recognition, including Contracts and Grants

Name of Candidate: Hsin-Chih (Tim) Yeh

Honors and Awards

I have received several awards and honors after joining UT in August 2012. In particular, in December 2013, I was given a Postdoctoral Publication Prize by Los Alamos National Laboratory. This is one of the most prestigious awards that LANL gives to its former postdoctoral associates – only two Publication Prizes are given every year. I gave a lecture about my research at UT in LANL's Physics Auditorium right after the award ceremony. This award reflects my innovative and pioneering research in the field of noble metal nanoclusters. In 2016, I was recognized by an Outstanding Faculty Award for the BME department from the Cockrell School of Engineering and the Student Engineering Council at UT. This award highlights my effort and devotion to education. The list of honors and awards is provided below. The ones that I received after I joined UT in 08/2012 are bolded.

- **2017 Texas 4000 Foundation Grant (2/2/2017).**
- **2016 Outstanding Faculty Award for the BME department from the Cockrell School of Engineering and the Student Engineering Council, University of Texas at Austin (4/20/2016).**
- **2016 NSF Division of Chemistry, Chemical Measurement Imaging Grant (5/9/2016).**
- **2015 NIH NCI, Institute of Molecular Analysis Technologies (IMAT) R21 Grant (3/19/2015).**
- **2015 Texas 4000 Foundation Seed Grant (8/4/2014).**
- **2013 Postdoctoral Publication Prize in Experimental Sciences at Los Alamos National Laboratory (12/18/2013).**
- **2013 Welch Foundation Grant (4/1/2013).**
- 2011 R&D 100 Award on "NanoCluster Beacons", primary developer (6/22/2011).
- Best conference paper award in the 6th Annual IEEE International Conference on Nano/Micro Engineered and Molecular System, 2011 (2/22/2011).
- Graduate student fellowship, Johns Hopkins, 2004.

Research Grant Support

Our laboratory has received significant external funding to support our research, including Welch Foundation Grant (13-19), Texas 4000 (14 and 17), NIH R21 Grant (15-18), and NSF Grant (16-19). Among these grants, two are from federal agents; one is from state agent; and one is from private foundation.

Grants from federal agencies:

In 2015, I received a 3-year NIH R21 grant from the Innovative Molecular Analysis Technologies (IMAT) program under National Cancer Institute to support our effort in developing an advanced 3D single-molecule tracking microscope to study cancer biology. This funding helped us create an enabling tool that our collaborator, Dr. Mien-Chie Hung, at MD Anderson Cancer Center is using to investigate the internalization and trafficking dynamics of important signaling receptors in tumors. The funding rate at NCI is at 9%.

In 2016, I received a 3-year NSH grant from the Chemistry Division to support the development of novel fluorescent nanoparticles for molecular imaging and measurement. In this project, we study the fundamental chemical and photophysical properties of few-atom noble metal nanoclusters and design a platform to conduct high-throughput selection of fluorescent species with optimal properties. This basic

science research is critical to the field of fluorescence microscopy and spectroscopy. The funding rate at NSF Chemistry Division is 15%.

Grants from State of Texas:

In 2013, I received a 3-year Welch Foundation grant to support the development of new DNA methylation sensing techniques. In 2016, this Welch grant was renewed for another 3 years. Through this grant, we have successfully invented a new multicolor sensor for N^6-methyladenine detection. We are now working with chemists and using a variety of advanced analytical chemistry methods to perform this basic chemistry research.

Grants from private foundations:

In 2014 and 2017, I received two grants from the Texas 4000 Foundation, respectively. Texas 4000 is a student-founded, non-profit organization that raises charity funds through bicycle riding from Austin TX to Anchorage AK every summer. Using these seed funds, we have generated preliminary data and are now in the process to compete for federal grants.

Summary List:

Sponsor	Co-PI	Title	Grant Total	Candidate Share	Grant Period
Texas 4000		Molecular trajectory as a biomarker for early detection of castration resistance	$25,000	$25,000	2/17/17-2/16/18
NSF	Jeff Petty	Engineering silver clusters for molecular measurement	$550,000	$300,000	7/1/16-6/30/19
NIH	Andy Dunn	An integrated imaging tool for probing EGFR subcellular trafficking in real time	$430,000	$250,000	6/1/15-5/31/18
Texas 4000		An integrated tool for probing receptor trafficking and signaling in cancer cells	$25,000	$25,000	9/1/14-8/31/15
Welch		NanoCluster Beacons for highly specific DNA methylation detection			6/1/13-5/31/19

Honors and Awards for Students

In the past 5 years many of my undergraduate and graduate students received awards and recognitions for their excellent performance in research, presentation, and course work. In particular, after joining my group at UT, two of my international graduate students, Yen-Liang Liu and Yuan-I Chen, received fellowships ($32k for 2 years) from their home country. One domestic graduate student, Evan Perillo, received PicoQuant Young Investigator Award at SPIE conference. Evan has graduated in 2017 and is now working at Los Alamos National Laboratory as a postdoc. Many of our undergraduate students became co-authors on our journal publications and received Undergraduate Research Fellowship from the Cockrell School of Engineering. In particular, an undergraduate student, Darren Imphean, won poster awards twice, published two papers with us, and received Undergraduate Research Fellowship twice. He even gave an oral presentation at BMES conference. Darren has graduated in 2017 and is now a student at UT Southwest Medical School. A summary of students' honors and awards is given below:

Undergraduate students honors and awards:

1. Austin Batson	BME	9/12-5/14	○ 1st place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2013. ○ Co-author on a 2013 *Biosensors* article.
2. Mark Babin	Chemistry	1/13-8/14	○ Co-author on a 2013 *Biosensors* article. ○ Co-first author on a 2014 *ACS Nano* article.
3. Quincy Zhuang	BME	2/14-5/15	○ Co-author on a 2014 *IEEE-NEMS* conference proceeding.
5. Ben Hoang	BME	2/14-8/15	○ Undergraduate Research Fellowship ($1000), 2014.
7. Kevin Varghese	BME	8/14-5/16	○ Undergraduate Research Fellowship ($1000), 2014.
8. Peter Yu	BME	2/14-5/16	○ Undergraduate Research Fellowship ($1000), 2014 and 2015. ○ 3rd place at the National Institutes of Health's Design by Biomedical Undergraduate Teams (DEBUT) Challenge, 2015. ○ 1st place at the Engineering World Health Annual Design Competition, 2015 ○ Co-author on a 2016 *Biophysical Journal* article. ○ Poster presentation at 2014 BMES conference.
9. Mary Gwozdz	BME	6/15-5/16	○ Undergraduate Research Fellowship ($1000), 2015. ○ Co-author on a 2015 *JACS* article.
11. Darren Imphean	BME	6/14-5/17	○ Undergraduate Research Fellowship ($1000), 2014 and 2015. ○ 1st place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2015. ○ 2nd place at the 2015 Spring BME Undergraduate Research Poster Competition, 2015. ○ Co-author on a 2015 *Nanoscale* article. ○ Co-author on a 2017 *JACS* article. ○ Oral presentation at 2014 BMES conference.
12. Ajay Rastogi	BME	6/15-5/17	○ 3rd place at the National Institutes of Health's Design by Biomedical Undergraduate Teams (DEBUT) Challenge, 2015. ○ 1st place at the Engineering World Health Annual Design Competition, 2015. ○ Co-author on a 2017 *Analytical Chemistry* article.
13. Sunny Kim	BME	1/16-	
14. Rohan Vasisht	BME	1/16-5/17	○ 3rd place in the underclassmen division at the Annual Cockrell School Poster Exhibition on Engineering Research (PEER), 2017. ○ Undergraduate Research Fellowship ($1000), 2017.
15. Karena Yu	BME	1/16-5/17	○ Undergraduate Research Fellowship ($1000), 2016.

Graduate students' honors and awards:

Cong Liu	2015	George J. Heuer, Jr. Ph.D. Endowed Graduate Fellowship
Evan Perillo	2015	PicoQuant Young Investigator Award
Evan Perillo	2016	GS University Graduate Continuing Fellowship
Yen-Liang Liu	2015	Biophysics society annual meeting travel award ($300)
Yen-Liang Liu	2015	NATEA-Dallas Scholarship ($100)
Yen-Liang Liu	2016	Study Abroad Scholarship from Ministry of Education in Taiwan ($32k)
Yen-Liang Liu	2017	Single-cell biophysics symposium travel award ($1000)
Yuan-I Chen	2017	Study Abroad Scholarship from Ministry of Education in Taiwan ($32k)
Yuan-I Chen	2017	Travel grant from Cockrell School of Engineering ($500)
Yuan-I Chen	2017	Travel award from the 2017 q-bio summer school

Invited Lectures

I have been invited to give seminars on my research around the country and internationally. In particular, I was given a postdoc publication prize by Los Alamos National Laboratory in Dec 2013 and I delivered a lecture right after the award ceremony. In addition, I was invited to give a "Distinguished iNANO Lecture" at the iNANO Center in the Aarhus University, Denmark, in 2014. A summary of invited lectures is given below. All these lectures were at the department, center, or institute level.

1. "A colorful tale of NanoCluster Beacons", Physics Division, Los Alamos National Laboratory, Los Alamos, NM, Dec 19, 2013.
2. "Silver cluster-based biosensing and advanced molecular tracking microscopes", Chemistry Department, Furman University, Greenville, SC, Mar 26, 2014.
3. "Silver cluster-based biosensing and advanced molecular tracking microscopes", Distinguished iNANO Lecture, iNANO Center, Aarhus University, Aarhus, Denmark, Jun 13, 2014.
4. "Silver cluster-based biosensing and advanced molecular tracking microscopes", Plant and Environmental Sciences Department, University of Copenhagen, Copenhagen, Denmark, Jun 16, 2014.
5. "Advanced molecular tracking microscopes and few-atom silver cluster-based biosensing", Graduate School of Biomedical Sciences, University of Texas Health Science Center San Antonio, San Antonio, TX, Apr 3, 2015.
6. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, University of California, Los Angeles, Los Angeles, CA, Jan 14, 2016.
7. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, Columbia University, New York City, NY, Jan 22, 2016.
8. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, University of Pennsylvania, Philadelphia, PA, Mar 1, 2016.
9. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, Pennsylvania State University, State College, PA, Mar 30, 2016.
10. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Pathology Department, Johns Hopkins University, Baltimore, MD, April 27, 2016.
11. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Chemistry Department, Oregon State University, Corvallis, OR, May 11, 2016.
12. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Mechanical Engineering Department, National Taiwan University, Taipei, TAIWAN, June 13, 2016.
13. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Engineering and System Science Department, National Tsing Hua University, Hsinchu, TAIWAN, June 14, 2016.

14. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Institute of Biomedical Engineering and Nanomedicine (IBEN), National Health Research Institutes (NHRI), Zhunan, TAIWAN, June 15, 2016.
15. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, TAIWAN, June 16, 2016.
16. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Biomedical Engineering Department, Rice University, Houston, TX, Aug 30, 2016.
17. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Electrical and Computer Engineering Department, University of Minnesota, Twin Cities, Minneapolis, MN, Sep 8, 2016.
18. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Chemistry and Biochemistry Department, University of Maryland Baltimore County, Baltimore, MD, Mar 3, 2017.
19. "TSUNAMI 3D tracking microscope and segmentation analysis of 3D trajectories of EGFR trafficking", Greehey Children's Cancer Research Institute, University of Texas Health Science Center at San Antonio, San Antonio, TX, May 5, 2017.
20. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Electrical Engineering Department, National Taiwan University, Taipei, TAIWAN, Jun 8, 2017.
21. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Materials Science and Engineering Department, National Cheng Kung University, Tainan, TAIWAN, Jun 13, 2017.
22. "Super-resolution 3D molecular tracking microscopes and silver cluster-based biosensors", Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, TAIWAN, Jun 23, 2017.

Yeh, [Hsin-Chih] Tim

LETTERS

A minimum of four review letters should be listed *alphabetically* with affiliation, etc.

Name of reviewer, rank or title, department, university	**Professor Gang Bao** Professor, Bioengineering Rice University CPRIT Scholar
Brief statement of expertise and reason for selection*	Professor Bao is a pioneer researcher in biosensing and nanotechnology, an Established Investigator awardee of CPRIT (Cancer Prevention Research Institute of Texas), and highly cited scholar in his area, with ~16,000 citations on GoogleScholar.
Other relevant information**	Candidate and letter writer share common scientific interests in nanosensors and nanoparticle physics; have interacted through conferences and invited seminars at their respective universities.
Nominated by	Candidate
Date letter received	7/19/17

Name of reviewer, rank or title, department, university	**Professor Robert Dickson, Ph.D.** Vasser Woolley Professor Department of Chemistry & Biochemistry Georgia Institute of Technology
Brief statement of expertise and reason for selection*	Professor Dickson was selected as an established researcher in novel spectroscopic, statistical, and imaging technologies for the study of dynamics in biology and medicine. He is Sr. Editor of the Journal of Physical Chemistry and well-cited in his field with over 11,000 citations via GoogleScholar.
Other relevant information**	Candidate and letter writer share common scientific interests in noble metal nanoparticles for diagnostic imaging.
Nominated by	Budget Council
Date letter received	7/31/17

Name of reviewer, rank or title, department, university	**Professor Taekjip Ha, Ph.D.** Professor, Biomedical Engineering Johns Hopkins University

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

Brief statement of expertise and reason for selection*	Dr. Ha was selected for his foundational work in single molecule detection, which interacts with the candidate's research interests. He is a National Academy of Sciences member, Academy of Arts and Sciences member and Howard Hughes Medical Investigator. He is extremely highly cited, with 24,000+ citations via GoogleScholar.
Other relevant information**	Candidate and letter writer share common scientific interests in single-molecule detection and biophysics. They have interacted at conferences and via an invited seminar at UT that Dr. Ha gave in Fall 2016. They did not overlap at JHU (when candidate was a student) as Dr. Ha was at UIUC until 2015 (and candidate finished PhD in 2008).
Nominated by	Candidate
Date letter received	7/10/17

Name of reviewer, rank or title, department, university	**Professor Chih Ming Ho, Ph.D.** Distinguished Research Professor Department of Mechanical and Aerospace Engineering University of California Los Angeles
Brief statement of expertise and reason for selection*	Dr. Huang was selected for his contributions in bio-nano technology, micro/nano fluidics, and turbulence. He was ranked by ISI as one of the top 250 most cited researchers in all engineering category around the world. In 1997, Dr. Ho was inducted as a member of the National Academy of Engineering (NAE). In the next year, he was elected as an Academician of Academia Sinica which honors scholars of Chinese origin with exceptional achievements in liberal arts and sciences. Dr. Ho holds five honorary professorships. He has published 260 papers and 10 patents. He presented over 100 keynote talks in international conferences. Dr. Ho was elected Fellow of the American Physical Society (APS) as well as American Institute of Aeronautics and Astronautics for his contributions in a wide spectrum of technical areas.
Other relevant information**	Candidate and letter writer share common scientific interests in bionanotechnology and MEMS. Dr. Ho did serve on Dr. Yeh's Master's degree thesis committee, but he was selected to write by the Budget Council and not by Dr. Yeh.
Nominated by	Budget Council
Date letter received	7/18/17

Name of reviewer, rank or title, department, university	**Professor Tony Huang, Ph.D.** Professor Department of Mechanical Engineering & Materials Science Duke University

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

Brief statement of expertise and reason for selection*	Dr. Huang was selected for mutual research interests in the fields of acoustofluidics, optofluidics, and micro/nano systems for biomedical diagnostics and therapeutics. He has authored/co-authored over 160 peer-reviewed journal publications in these fields. His journal articles have been cited more than 7500 times, as documented at Google Scholar (h-index: 50). He also has 16 patents and invention disclosures. He is a fellow of the American Institute for Medical and Biological Engineering (AIMBE), the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the Institute of Physics (IOP), and the Royal Society of Chemistry (RSC).
Other relevant information**	Candidate and letter writer share common scientific interests in micro/nano systems for biomedical diagnostics and therapeutics.
Nominated by	Budget Council
Date letter received	7/24/17

Name of reviewer, rank or title, department, university	**Professor Abraham P. Lee, Ph.D.** William J. Link Professor and Chair Department of Biomedical Engineering University of California, Irvine
Brief statement of expertise and reason for selection*	Dr. Lee was selected as Chair of Biomedical Engineering at UC Irvine and research interests focused on the development of integrated "digital" micro/nano fluidic chips for the following applications: point-of-care diagnostics, "smart" nanomedicine for early detection and treatment, automated cell sorting based on electrical signatures, tissue engineering and stem cells, the synthesis of ultra-pure materials, and biosensors to detect environmental and terrorism threats. He is a fellow of AIMBE and ASME.
Other relevant information**	Candidate and letter writer share common scientific interests in nanomedicine and diagnostics.
Nominated by	Budget Council
Date letter received	7/24/17

Name of reviewer, rank or title, department, university	**Professor Kam Leong, Ph.D.** Samuel Y. Sheng Professor, Biomedical Engineering Professor, System Biology Columbia University

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

Brief statement of expertise and reason for selection*	Dr. Leong's research focuses on stem cell engineering and nanostructures for therapeutic delivery. He is a thought leader and well-established researcher in nanotherapeutics with an extremely well cited record of over 35,000 citations (via GoogleScholar).
Other relevant information**	Candidate and letter writer share common scientific interests in in nanotherapeutics. They have interacted during candidate's Ph.D. training, though not as collaborators. Dr. Leong and the candidate did appear as authors on the same paper in 2015; candidate published Nanoscale paper (at UT as corresponding author), of which Dr. Leong is a co-author. The key collaborator on this project is actually Birgitta Knudsen at Aarhus University – Dr. Knudsen and Dr. Leong shared a postdoc, who is the first author of the paper. This is the only collaborative interaction between the letter writer and candidate.
Nominated by	Candidate
Date letter received	8/6/17

Name of reviewer, rank or title, department, university	**Professor Andrew Tsourkas, Ph.D.** Professor, Department of Bioengineering University of Pennsylvania
Brief statement of expertise and reason for selection*	Dr. Tsourkas is an expert in biosensing and probe development, a shared area of interest for both he and the candidate. He is a fellow of American Institute of Medical and Biological Engineering (AIMBE).
Other relevant information**	Candidate and letter writer share common scientific interests in novel imaging agents, nanoprobes and sensing devices for diagnostics. They have interacted via seminars and conferences.
Nominated by	Candidate
Date letter received	7/9/17

Decline:

Name of reviewer, rank or title, department, university	**Professor Elisabeth Gwinn, Ph.D.** Professor Department of Physics University of California Santa Barbara
Brief statement of expertise and reason for selection*	Dr. Gwinn was selected for her specific knowledge of shared research interests in single-molecule studies, gold nanoclusters, and applications for their diagnostic potential.

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

Other relevant information**	Candidate and letter writer share common scientific interests in bionanotechnology and MEMS.
Nominated by	Budget Council
Reason for Declination	Time commitment and personal family issues, detailed in attached message.

No Response:

Name of reviewer, rank or title, department, university	**Professor Ming C Wu, Ph.D.** Nortel Distinguished Professor Department of Electrical Engineering & Computer Science University of California, Berkeley
Brief statement of expertise and reason for selection*	Dr. Wu was selected for his knowledge and expertise of shared research interests in physical electronics, MEMS (micro-electro-mechanical systems), MOEMS, semiconductor optoelectronics, nanophotonics, and optofluidics. He has published 7 book chapters, over 220 journal papers and 350 conference papers. He is the holder of 23 U.S. patents. Prof. Wu is a Fellow of IEEE, a Packard Foundation Fellow (1992-1997). He received the 2007 Paul F. Forman Engineering Excellence Award from Optical Society of America.
Other relevant information**	Candidate and letter writer share common scientific interests in MEMS and nanophotonics.
Nominated by	Budget Council

Name of reviewer, rank or title, department, university	**Professor Haw Yang, Ph.D.*** Professor Department of Chemistry & Chemical Biology Princeton University
Brief statement of expertise and reason for selection*	Dr. Yang was selected for his expertise in biophysical dynamics and approaches to single-molecule protein dynamics, and nanomedicine. He is a fellow of the Royal Society of Chemistry (2013).
Other relevant information**	Candidate and letter writer share common scientific interests in single-molecule dynamics.
Nominated by	Budget Council

*Alternates

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Biomedical Engineering • 107 W. Dean Keeton St. • Austin, Texas 78712-0238
(512) 475-8698 • FAX (512) 471-0616

June 7, 2017

Dr. Gang Bao, Ph.D.
Foyt Family Professor in Bioengineering
Department of Bioengineering
Rice University
500 Main Street, Suite 1030
Houston, Texas 77030
713.348.5869
email: gang.bao@rice.edu

Dear Dr. Bao:

The Department of Biomedical Engineering is considering Dr. Hsin-Chih "Tim" Yeh for tenure and advancement in rank to the position of Associate Professor at The University of Texas at Austin. We would appreciate your candid assessment of his scholarly contributions to assist our decision-making process. Excellent teaching is an important criterion for promotion, but our evaluation of teaching is being carried out separately, and we are asking you only for information about his scholarly distinction. Copies of Dr. Yeh's curriculum vitae and several recent papers are enclosed for your review.

We would appreciate your opinions regarding Dr. Yeh's major engineering and/or scientific contributions. In preparing your assessment, please consider the following questions:

1. Do you know Dr. Yeh, and if so, for how long and under what circumstances?
2. What are the original, innovative, and/or important contributions that he has made in his field of research? Have his publications influenced the thinking of, or the methods used by, others in your field?
3. How would you assess Dr. Yeh's development compared with others in his cohort at research-intensive universities?
4. What is your perspective on Dr. Yeh's promise for further professional growth and leadership?

We would be grateful for any additional comments you might have. The more specific you can be in your comments, the more helpful your evaluation will be.

Under the laws of the State of Texas, Dr. Yeh has the right to request to see any materials in his personnel file, including your letter. Members of our faculty and internal review committees who see your letter as part of the promotion process will hold the comments you make in confidence, however.

For your comments to receive full consideration, we will need to receive a signed letter from you no later than **July 14, 2017**. It is not necessary for you to send us a hard copy of your letter, an electronic or scanned version is sufficient, provided your institutional letterhead and your signature are included. In addition, please enclose a copy of a short version of your curriculum vitae (preferably no longer than two pages) or the URL for your web site where we may obtain this information. If you have questions, please call me at the number given on the letterhead.

Thank you for your time and assistance with this important matter. As faculty members, we realize that the amount of time required to do a thoughtful review is considerable.

Sincerely,

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering

SSE:cnc

Enclosure

List of Five Most Significant Works – Hsin-Chih "Tim" Yeh

1. 24. E.P. Perillo, Y.-L. Liu, K. Huynh, C. Liu, C.-K. Chou, M.-C. Hung, H.-C. Yeh*, and A. Dunn* (co-corresponding authors) "Deep and high-resolution three-dimensional tracking of single particles using nonlinear and multiplexed illumination," Nature Communications 6, 7874, 2015.

2. 22. J.M. Obliosca, M.C. Babin, C. Liu, Y.-L. Liu, Y.-A. Chen, R.A. Batson, M. Ganguly, J.T. Petty, and H.-C. Yeh, "A complementary palette of NanoCluster Beacons," ACS Nano 8(10): 10150-10160, 2014.

3. 32. J.M. Obliosca, S.Y. Cheng, Y.-A. Chen, M.F. Llano, Y.-L. Liu, D.M. Imphean, D. Bell, J.T. Petty, P. Ren and H.-C. Yeh, "LNA thymidine monomer enables differentiation of the four singlenucleotide variants by melting temperature," JACS 139(20): 7110-7116, 2017.

4. 25. Y.-A. Chen, J.M. Obliosca, Y.-L. Liu, C. Liu, M.L. Gwozdz, and H.-C. Yeh, "NanoCluster Beacons enable detection of a single N6-methyladenine," Journal of the American Chemical Society 137(33): 10476-10479, 2015.

5. 29. Y.-L. Liu, E.P. Perillo, C. Liu, P. Yu, C.-K. Chou, M.-C. Hung, A.K. Dunn and H.-C. Yeh, "Segmentation analysis for trajectories acquired by the TSUNAMI tracking microscope: An application to EGFR trafficking," Biophysical Journal 111(10): 2214-2227, 2016.

Candidate

George R. Brown School of Engineering
Department of Bioengineering
Gang Bao, PhD
Foyt Family Professor
July 19, 2017

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering
The University of Texas at Austin
Austin, Texas 78712

Dear Shelly:

I am writing to provide an assessment of Dr. Hsin-Chih "Tim" Yeh's scholarly contributions for his promotion to Associate Professor with tenure at the University of Texas, Austin. Dr. Yeh received his PhD degree in Mechanical Engineering from the Johns Hopkins University in 2008, and did postdoc work for four years before joining the Department of Biomedical Engineering at UT Austin in 2012 as an Assistant Professor. I met Tim about 4 years ago during my visit to UT Austin, and have been in touch with him since. I invited Tim to visit Rice Bioengineering and give a seminar during fall 2016 semester; his seminar was very well received.

Dr. Yeh's research efforts are in the area of nanomedicine, with a focus on developing nanobiosensors for disease detection and diagnosis as well as basic biological studies. Since joining UT Austin, Tim has developed innovative methods for detecting and imaging biomolecules, including novel fluorescence probes and 3D single-molecular tracking microscopy. For example, Tim developed NanoCluster Beacons (NCBs) using DNAtemplated silver nanoclusters and showed that these nanosensors can serve as multicolor activatable probes for sensitive detection of multiple analytes, including DNA methylation, enzymatic activity, and single-nucleotide polymorphism. The NCBs have very unique properties therefore could enjoy a wide range of biomedical applications.

In collaboration with Dr. Andrew Dunn, Tim built two state-of-the-art 3D single-molecular tracking microscopes to investigate the internalization, transport and signaling dynamics of biomolecules such as membrane receptors, viral capsids and drug molecules in live cells and tissue. This innovative imaging method has the potential to provide a better understanding of the mechanisms involved in the development of various diseases including cancer by allowing researchers to visualize the transport dynamics of biomolecules in 3D tissue.

Tim is an original researcher. He has made clear, distinct and significant contributions to biomedical engineering and nanomedicine, as demonstrated by his 33 peer-reviewed journal papers (12 with Tim as corresponding author) and 7 patent applications. Tim has been quite visible, as demonstrated by his numerous conference presentations and invited seminars. Tim has been very successful in obtaining research funding, having 5 grants from different funding agents over the last 5 years with total funding of ~$1.4M. Given the tough funding situation, this is an excellent track record.

In summary, I believe Dr. Tim Yeh has made significant contributions to biomedical engineering, especially in developing and applying molecular imaging probes. He is an original researcher,

E-mail gang.bao@rice.edu Office 713-348-2764 Fax 713-348-5877 Rice University Department of Bioengineering-MS 142 PO Box 1892 Houston, TX 77251-1892

very talented, and highly motivated. At a similar career stage, I would compare him with my former colleague Dr. Phil Santangelo, who was promoted to Associate Professor with tenure at Georgia Tech a few years ago. With his strong record and excellent potential, I am confident that Tim will continue to do well in research, and make outstanding contributions to biomedical engineering. I therefore strongly support Dr. Tim Yeh's promotion to Associate Professor with tenure in the Department of Biomedical Engineering at the University of Texas, Austin.

Yours sincerely,

Gang Bao, Ph.D.
Foyt Family Professor
Department of Bioengineering
Rice University

Phone: 713-348-2764
Fax: 713-348-5877
E-Mail: gang.bao@rice.edu

E-mail gang.bao@rice.edu Office 713-348-2764 Fax 713-348-5877 Rice University Department of Bioengineering-MS 142 PO Box 1892 Houston, TX 77251-1892

Sunday, August 27, 2017 at 2:41:39 PM Central Daylight Time

Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Wednesday, July 19, 2017 at 4:37:41 PM Central Daylight Time
From: Gang Bao
To: Cunningham, Carrie N
CC: Sakiyama-Elbert, Shelly E
Priority: High
Attachments: Letter for Tim Yeh.pdf

Sorry for the delay. Attached please find my letter for Tim's promotion.

Regards.

Gang

On Jul 10, 2017, at 11:06 AM, Cunningham, Carrie N <carrie.c@austin.utexas.edu> wrote:

Just a friendly reminder of the request below for a letter for Dr. Hsin-Chih "Tim" Yeh's promotion to Associate Professor at The University of Texas at Austin.

If you are still able to assist, please advise when you might be able to provide a letter. We do have some flexibility on the deadline. We greatly appreciate your assistance with this process.

Best,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

---

From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:17 PM
To: "gang.bao@rice.edu" <gang.bao@rice.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Bao,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

RICE Bioengineering
George R. Brown School of Engineering

SEARCH

DEPARTMENT OF BIOENGINEERING

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Gang Bao

Foyt Family Professor in Bioengineering
Director, Nanomedicine Center for Nucleoprotein Machines
CPRIT Scholar in Cancer Research

Laboratory of Biomolecular Engineering and Nanomedicine

Postdoctoral Fellow, Materials Department, University of California, Santa Barbara (1988-1991)
Ph.D., Applied Mathematics, Lehigh University (1987)
M.Sc., Applied Mathematics, Shandong University (1981)
B.S., Mechanical Engineering, Shandong University (1976)

Bio Sketch

Gang Bao is a pioneer in nanomedicine, molecular imaging, and the emerging area of genome editing. The nanoscale structures and devices engineered in his lab have broad-based applications in basic biological research toward the understanding of underlying causes of disease, as well as in the translation of nano-scale tools for disease diagnostics and treatment, such as targeted drug/gene and cell-based therapies.

Bao joined Rice University's Department of Bioengineering in March 2015. In addition to his outstanding track record in basic and translational research as a principal investigator at Johns Hopkins and at the Georgia Institute of Technology and Emory University, he brings two decades of significant experience in the development of leading research and education programs in biomedical engineering. Three multidisciplinary centers, directed by Bao at Georgia Tech, have focused on the detection and treatment of cardiovascular disease, the development of engineered nucleases for treating single-gene disorders such as sickle-cell disease, and pediatric nanomedicine approaches for improving children's health.

Along with his lab, Bao brings his Nanomedicine Center for Nucleoprotein Machines to Rice. The National Institutes of Health-funded center is developing gene correction techniques to address an estimated 6,000 single-gene disorders. Their first target is sickle-cell disease, caused by a single mutation in the beta-globin gene. Bao's ground breaking work in designing and optimizing engineered nucleases plays an essential role in this nanomedicine center. Using DNA-cutting enzymes, such as CRISPR/Cas9 systems, Transcription Activator-Like Effector Nucleases (TALENs) and Zinc Finger Nucleases (ZFNs), Bao is developing tools for precise gene editing. He has also been developing nanotechnologies for multimodality molecular imaging, sensitive detection of RNA and proteins, and for targeted drug delivery.

Investigations in the Bao lab are highly collaborative, interrelated, well-suited for medical and life-science applications. In 2003, he co-founded Vivonetics, Inc., a biotechnology company that aims to develop kits and custom products to enable the visualization of gene expression in living cells. In addition, 10 of his nanotechnologies have U.S. patents or provisional patents. They include nanostructured probes such as fluorescent molecular beacons, semiconductor quantum dots and magnetic nanoparticles for use as contrast agents to study diseases and to analyze the underlying biological processes.

Grants from the NIH Common Fund, from the National Heart, Lung and Blood Institute, and from the National Science Foundation are supporting Bao's development of molecular imaging probes, and engineered nucleases and nanocarriers for drug/gene delivery. These technologies have been applied to a broad range of disease studies, including cardiovascular disease, cancer, and sickle-cell disease.

New research in the Bao lab is supported by a $6 million grant from the Cancer Prevention and Research Institute of Texas (CPRIT). The work will focus on a high level of integration and synergy between physician-scientists and clinicians as well as in the development of programmatic, education and cross training components for a highly specialized workforce in biology, clinical medicine, and the quantitative sciences.

Bao is the author of more than 150 refereed publications, two books and four book chapters. He is an elected fellow of the American Institute for Medical and Biological Engineering (2007), of the American Physical Society (2007), of the American Association for the Advancement of Science (2009), and of the American Society of Mechanical Engineers (2009). He has served

as a member of the Society of Engineering Science's Board of Directors (2006-2009).

Research Statement

Research in the Bao lab is centered at developing nanotechnologies and biomolecular engineering approaches for basic biological studies and medicine, which spans the spectrum from chemical synthesis to small animal studies. Current methodology development includes the superparamagnetic nanoparticle probes, quantum dot bioconjugates, activitable molecular probes and molecular beacons for cellular and in vivo imaging, with applications in disease detection and mechanistic studies. The Bao lab also develops novel strategies for drug/gene delivery using targeted nanoparticles, gene targeting approaches for treating single-gene disorders and other diseases using engineered nucleases, as well as bioinformatics tools and engineered nanodevices driven by biomolecular motors. The development of the methodologies involves nanoprobe and nanodevice design and validation, synthesis of biomolecules and nanoparticles, bioconjugation, specific tagging and targeting, cellular delivery, surface modification, protein production and purification, as well as addressing issues such as sensitivity, specificity, spatial and temporal resolution and signal-to-background ratio in molecular imaging, and efficacy in disease treatment. These novel technologies and methods have a broad range of applications, both in basic biological research, and disease studies.

Department of Bioengineering 6500 Main Street, Suite 1030, Houston, Texas 77030 Mailing Address: MS-142, 6100 Main Street, Houston, Texas 77005-1892
Phone: 713.348.5869 Fax: 713.348.5877

Georgia Institute of Technology
School of Chemistry and Biochemistry

BC

July 30, 2017

Professor Shelly E. Sakiyama-Elbert, Chair
Fletcher Stuckey Pratt Chair in Engineering
Department of Biomedical Engineering
The University of Texas at Austin
107 W. Dean Keeton St.
Austin, Texas 78712-0238

Dear Professor Sakiyama-Elbert:

It is a pleasure to strongly support Hsin-Chih Yeh's promotion to the rank of Associate Professor with tenure at UT-Austin. Professor Yeh has been highly successful and visible and fully deserves to be promoted, without any reservations. Professor Yeh has made multiple fundamental and original contributions in nanoscience and nanoengineering. He works in the related fields of probe development, DNA and protein biosensor development, and optical tracking in biological environments. While his work in tracking instrumentation is very high quality, and I enjoyed reading the provided manuscripts on this topic, this is not my specific area. There are many potential advances to be made and I am quite sure that Professor Yeh will be at the forefront of these studies. I will largely focus my comments on the remainder of his exciting research program, as this is in an area that I know very well. As background, I have been at Georgia Tech since 1998, and was promoted to Professor in 2005. I am now the Vasser Woolley Professor of Chemistry and Biochemistry and a Senior Editor for The Journal of Physical Chemistry. I work in the field of fluorescence microscopy, probe development, single molecule spectroscopy of materials and biological systems, and statistics for multidimensional data analysis. I have never met Professor Yeh, but I have collaborated with one of his collaborators, Professor Jeff Petty from Furman University, continuously since 2002. I know of his excellent work due to the significant overlap of our fields.

One of Professor Yeh's most significant contributions has been his advances with new silver nanocluster-based fluorophores encapsulated in single-stranded DNA. My own group initially created these novel emitters in 2004, but Professor Yeh has actually made these materials into useful biosensors – a feat that we were unable to do. By understanding and engineering the DNA-Ag interactions, Professor Yeh has turned these chromophores into activatable or fluorogenic probes for highly selective DNA detection. Because Professor Yeh's nanoclusters bind the DNA hosts to switch dark clusters to fluorescently bright species, they provide an inexpensive and easily created route to DNA single nucleotide polymorphism detection and species identification. His efforts have defined new directions in DNA detection and nanotechnology for selective in vitro and in vivo quantitative detection.

School of Chemistry and Biochemistry
Atlanta, Georgia 30332-0400 U.S.A.
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Georgia Institute of Technology
School of Chemistry and Biochemistry

After his initial demonstrations of fluorogenic DNA detection, Professor Yeh has further improved sensitivity and selectivity by magnifying red fluorescence 500-fold when a single-stranded DNA/silver cluster conjugate hybridizes with guanine-rich DNA sequences. These important NanoCluster Beacons exhibit high (>100) signal-to-background ratios without the need for separation. Professor Yeh's approach offers greater sensitivity than molecular beacons based on organic dyes, while simultaneously being simpler, much less expensive, and compatible with commercial DNA synthesizers. This original contribution has already led to multiple key developments, including his extension of this approach to protein detection through fluorogenic aptamer design. Professor Yeh has since expanded the palette of fluorogenic DNA-Ag chromophores to enable multiplexed detection. He has also harnessed the extreme selectivity of DNA and his fluorogenic clusters to detect even single nucleotide polymorphisms (individual DNA mutations) that can be indicative of specific disease states. The minimal processing, ease of synthesis, fluorogenic detection, cost effectiveness, and extreme sensitivity that Professor Yeh's efforts have yielded promise the development of important new, rapid assays for point-of-care diagnostics. Professor Yeh has been very productive in his time at UT Austin, and continues to make very important and exciting advances that improve medical detection, DNA detection, and fluorescent probe technologies.

Having served on Departmental, Dean's, and Provost-level Promotion and Tenure committees, I have no doubt that Professor Yeh would be promoted and tenured here at Georgia Tech. He appears to have multiple successful collaborations, sufficient funding to support his research efforts and is already well-known and respected for his accomplishments to date. Comparisons are difficult, but Professor Yeh's accomplishments have already surpassed those of his postdoctoral advisors at LANL. Comparing to more junior folks, I would rank him on a similar level as Randall Goldsmith (recently tenured at the University of Wisconsin-Madison) and above my own colleague, Professor Christine Payne, who was promoted at Georgia Tech a few years ago. In comparison with Professor Payne, for example, Professor Yeh's contributions are more significant and, in my opinion, he shows greater promise. I am sure that Professor Yeh will continue to excel and he is fully deserving of tenure and promotion to the rank of Associate Professor at The University of Texas – Austin. I strongly support Professor Yeh's promotion and tenure without reservation.

Sincerely,

Robert M. Dickson, Ph.D.
Vasser Woolley Professor
School of Chemistry & Biochemistry

School of Chemistry and Biochemistry
Atlanta, Georgia 30332-0400 U.S.A.
PHONE 404•894•4002
FAX 404•894•7452

Sunday, August 27, 2017 at 2:42:18 PM Central Daylight Time

Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Monday, July 31, 2017 at 5:45:53 AM Central Daylight Time
From: Dickson, Robert M
To: Cunningham, Carrie N
CC: Dickson, Robert M, Sakiyama-Elbert, Shelly E
Attachments: Yeh_ReferenceLetter_Jul2017.pdf, Dickson CV 2017-reduced.pdf

Hi Carrie,
Attached is my letter for Professor Yeh's package. A reduced copy of my CV is also attached.
Best regards,
Rob

==========
Robert M. Dickson
Vasser Woolley Professor
School of Chemistry and Biochemistry
Georgia Institute of Technology
901 Atlantic Dr.
Atlanta, GA 30332-0400
phone) 404-894-4007
fax) 404-385-6057
e-mail) dickson@chemistry.gatech.edu
internet) http://www.chemistry.gatech.edu/faculty/Dickson

On Jul 21, 2017, at 9:09 AM, Cunningham, Carrie N <carrie.c@austin.utexas.edu> wrote:

Dr. Dickson,

We are flexible; by 7/31 would be our latest, ideally. Thanks very much for your help!

Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

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From: "Dickson, Robert M" <robert.dickson@chemistry.gatech.edu>
Date: Thursday, July 20, 2017 at 6:52 PM
To: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Cc: "Dickson, Robert M" <robert.dickson@chemistry.gatech.edu>, "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Hi Carrie,
When do you need this letter by? I hope to finish this up next week.
My apologies for the delay, but Professor Yeh is doing very well, and I would like to provide a letter.
Thanks,

Rob

==========

Robert M. Dickson
Vasser Woolley Professor
School of Chemistry and Biochemistry
Georgia Institute of Technology
901 Atlantic Dr.
Atlanta, GA 30332-0400
phone) 404-894-4007
fax) 404-385-6057
e-mail) dickson@chemistry.gatech.edu
internet) http://www.chemistry.gatech.edu/faculty/Dickson

On Jul 10, 2017, at 12:05 PM, Cunningham, Carrie N <carrie.c@austin.utexas.edu> wrote:

Just a friendly reminder of the request below for a letter for Dr. Hsin-Chih "Tim" Yeh's promotion to Associate Professor at The University of Texas at Austin.

If you are still able to assist, please advise when you might be able to provide a letter. We do have some flexibility on the deadline. We greatly appreciate your assistance with this process.

Best,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

---

From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:18 PM
To: "dickson@chemistry.gatech.edu" <dickson@chemistry.gatech.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Dickson,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The

University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

Robert M. Dickson

Vasser Woolley Professor
School of Chemistry & Biochemistry
Georgia Institute of Technology

Educational Background:

B.A.	Chemistry	1991	Haverford College
Ph.D.	Physical Chemistry (Advisor: T. Oka)	1996	University of Chicago

Employment History:

Postdoctoral Fellow, Single molecule biophysics, UCSD (Advisor: W.E. Moerner)	1996-1998
Assistant Professor, Chemistry & Biochemistry, Georgia Tech	1998-2003
Associate Professor, Chemistry & Biochemistry, Georgia Tech	2003-2006
Professor, Chemistry & Biochemistry, Georgia Tech	2006-present
Vasser Woolley Professor, Georgia Tech	2015-present
Senior Editor, Journal of Physical Chemistry – Biophysics/Nanoscience	2010-present

Current Fields of Interest:

Nanoscience, Biological fluorophore design and spectroscopy, Membrane probes, Single molecule spectroscopy; Super-resolution and high-sensitivity imaging; Photoacoustic imaging; green fluorescent proteins; Protein-protein interactions; Multidimensional Statistics for improved medical diagnostics, Genome analysis, Biological signal processing.

Current Funding:

- **National Institutes of Health** – R01 AI107116, "Rapid antimicrobial susceptibility determination of bacterial pathogens" – Role: PI/PD
- **National Institutes of Health** – R21 EB020371, "Expanded dimensionality and high sensitivity cell imaging using designed OMFPs" – Role: PI/PD

Recently completed funding:

- **National Institutes of Health** – R01-GM086195, "Multifunctional fluorogenic Ag nanodots for dynamics intracellular single molecule imaging" – Role: PI/PD
- **National Institutes of Health** – 1R56AI107116-01, "Rapid antimicrobial susceptibility determination of bacterial pathogens" – Role: PI/PD
- **National Science Foundation/Chemical, Bioengineering, Environmental, and Transport Systems** – 0893692, "DNA-directed synthesis of fluorescent Ag clusters", Role: Co-PI
- **National Institutes of Health** – R21-EB009976, "Optically Modulated Fluorescent Proteins" – Role: PI/PD (Multi-PI)

Selected Activities to Scientific Community (partial list):

Senior Editor, Journal of Physical Chemistry B – Biophysics/Nanoscience, March 2010-present
Member, NIH – NANO study section, July 2008-June 2010
Ad-hoc Reviewer, Multiple NIH study sections, including CMIP, NANO, EBT, BECM, BBCB, Various Special emphasis panels
Reviewer and Participant, NSF Review Panels
Meeting Organizer, Multiple small meetings/workshops
Symposium Organizer, Multiple symposia within national meetings, ACS, MRS, APS, SPIE…
Mentor/Career Coach, GT ADVANCE Program
External Oversight Committee Member, South Carolina NIH-INBRE Program

Selected Service Activities for Georgia Tech (partial list from the past and present):

Member, University Promotion and Tenure Committee
Member, University Graduate Committee
Chair, Space Committee, School of Chemistry & Biochemistry
Chair, Reappointment, Promotion & Tenure Committee, School of Chemistry & Biochemistry
Chair, Awards Committee, School of Chemistry & Biochemistry

Honors and Awards (partial list):

- Publication (#72 below) identified as a "Key Publication" for the 2014 Nobel Prize in Chemistry
- >120 invited seminars since starting at Georgia Tech, many contributed talks
- Outstanding Achievement in Research Program Development
- Visiting Lecturer, National Science Council, Taiwan.
- Camille Dreyfus Teacher-Scholar Award
- Blanchard Professorship.
- Alfred P. Sloan Foundation Fellow.
- National Science Foundation, Faculty Early CAREER Award.
- Research Corporation, Research Innovation Award.
- Phi Beta Kappa.

Publications (>1000 citations/year since 2013, average >120 citations/publication, H-index of 44):

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July 10, 2017

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering
University of Texas at Austin

I am very pleased to evaluate Dr. Tim Yeh's accomplishments and to recommend strongly for his promotion to Associate Professor with tenure at the University of Texas at Austin. His research field is single molecule imaging and bionanotechnology. His accomplishments as judged based on publications are in two broad topics. First, he develops bright nanocluster probes that can be used for biotechnical applications and cellular imaging. Second, he develops 3D particle tracking methods that can followed the movements of single molecules and single molecular complexes. In some of his studies, he combines the two expertise and developed tools for novel applications. His publication record is enviable. In five short years, he has published as a senior author twelve papers in highly selective journals including JACS, ACS Nano, Nature Communications, Analytical Chemistry etc. Among the people who were recently promoted to a tenure position and are working on related topics, I can suggest that Julie Biteen at Michigan, Ann Arbor, is more comparable in stature and accomplishments. I have no doubt that his research accomplishments will grant him tenure at major research institutions including my current (Johns Hopkins U) and previous (UIUC). Dr. Yeh has filed invention disclosure or patent applications seven times (two as a UT faculty). He has federal grants from both NIH and NSF as the main PI and I am sure that he will maintain a well-funded research operation.

In terms of education, he is devoted to training young students. No fewer than 15 undergraduate research awards have been made to his students. Providing an integrated research and education experience to young students is a highly valued component.

He has been an active member of the community, chairing and organization sessions for multiple IEEE and BME meetings. My private conversation with him taught me that Dr. Yeh has a very broad

knowledge of advanced imaging and nanotechnology, and is most scholarly. He has my highest recommendation for promotion to Associate Professor with tenure.

Sincerely,

Taekjip Ha, Ph.D.

Bloomberg Distinguished Professor
Johns Hopkins University
Departments of Biophysics and Biophysical Chemistry;
Biophysics; Biomedical Engineering

Investigator
Howard Hughes Medical Institute

Sunday, August 27, 2017 at 2:42:37 PM Central Daylight Time

Subject: RE: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Monday, July 10, 2017 at 12:59:25 PM Central Daylight Time
From: Taekjip Ha
To: Cunningham, Carrie N
Attachments: Ha Letter for Tim Yeh.pdf

Dear Carrie,

Here is my letter evaluating Dr. Yeh.

TJ

From: Cunningham, Carrie N [mailto:carrie.c@austin.utexas.edu]
Sent: Monday, July 10, 2017 12:06 PM
To: Taekjip Ha <tjha@jhu.edu>
Cc: Sakiyama-Elbert, Shelly E <sakiyama@utexas.edu>
Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Importance: High

Just a friendly reminder of the request below for a letter for Dr. Hsin-Chih "Tim" Yeh's promotion to Associate Professor at The University of Texas at Austin.

If you are still able to assist, please advise when you might be able to provide a letter. We do have some flexibility on the deadline. We greatly appreciate your assistance with this process.

Best,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

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From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:18 PM
To: "tjha@jhu.edu" <tjha@jhu.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Ha,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

People

Taekjip Ha, PhD

Bloomberg Distinguished Professor

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Education

PhD, Physics, University of California at Berkeley, 1996
BS, Physics, Seoul National University, 1990

Research Interests

Ha's research is focused on pushing the limits of single-molecule detection methods to study complex biological systems. His group develops state-of-the-art biophysical techniques (e.g., multicolor fluorescence, super-resolution imaging, combined force and fluorescence spectroscopy, vesicular encapsulation, single-molecule pull-down) and applies them to study diverse protein-nucleic acid and protein-protein complexes, and mechanical perturbation and response of these systems both in vitro and in vivo.View more details (http://www.hhmi.org/research/single-molecule-studies-genomic-maintenance).

Selected Publications

From Pub Med (http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=Taekjip Ha%5BAuthor%5D) | Google Scholar Profile (https://scholar.google.com/citations?user=4SCvRv8AAAAJ&hl=en)

Publications Search

A. Jain, R. Liu, B. Ramani, E. Arauz, Y. Ishitsuka, K. Ragunathan, J. Park, J. Chen, Y. K. Xiang and **T. Ha**, "Probing cellular protein complexes using single-molecule pull-down (http://www.nature.com/nature/journal/v473/n7348/full/nature10016.html)," Nature 473, 484–488 (2011).

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BC

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SANTA BARBARA • SANTA CRUZ

Dr. Ho, Chih-Ming
Distinguished Research Professor
Tel: (310)-825-9993
Fax: (310)-206-2302
E-mail: chihming@g.ucla.edu
WWW: https://sites.google.com/g.ucla.edu/ho-lab-personalized-medicine

MECHANICAL AND AEROSPACE ENGINEERING DEPARTMENT
HENRY SAMUELI SCHOOL OF ENGINEERING AND APPLIED SCIENCE
ENG. IV, ROOM 44-116C
420 WESTWOOD PLAZA
LOS ANGELES, CALIFORNIA 90095-1597

July 16, 2017

Professor Shelly Sakiyama-Elbert
Department Chair
Fletcher Stuckey Pratt Chair in Engineering
Department of Biomedical Engineering
Cockrell School of Engineering
The University Of Texas at Austin
107 W. Dean Keeton St.
Austin, Texas 78712-0238

Dear Shelly:

It is my great pleasure to provide strongest support for Dr. Dr. Hsin-Chih "Tim" Yeh's promotion to Associate Professor with tenure. I have known Tim for about two decades, since he was a MS student in our department. He has made seminal impacts to many areas in bio micro/nano technology field, specifically in noble metal nanocluster sensor.

When Tim was at UCLA, his research topic was to design and fabricate a low cost and IC compatible process microchannel for heat removal in electronic circuitries and lasers. This was a hot subject in the early 90s. He came up an innovative resist double coating process and a novel high-aspect-ratio plating method, which make low-cost and highly efficient metallic microchannels for cooling IC chips.

At Hopkins, Tim has developed and published widely in micro/nano technology based DNA sensors. The most notable one is the paper on "Single-quantum-dot-based DNA nanosensor". Quantum dots possess a dual functionality, acting as a donor for fluorescence resonance energy transfer and as a concentrator for signal amplification. The quantum dot based sensor exhibits extremely low background while producing strong signals upon binding to small numbers of DNA target. This single quantum dot sensor has successfully been applied to the detection of Kras and Braf point mutations in clinical samples from patients with ovarian cancer. The work published in *Nature Materials* has triggered a great deal of interest in the field as reflected by its abundant citations, 818 citations, as of today.

At UT Austin, Tim continues to produce high volume, original and innovative researches in sensor area, but in a new direction. He has created an independent domain of research, such as the noble metal based nanocluster beacon and 3-D single molecule tracking technique. The nanocluster sensor possess multicolor capability and can measure several DNA methylations at the same time in living cells and offers rich information in enzyme activity, and single-nucleotide polymorphism. The phosphoflow technique developed by Garry Nolan at Stanford University enables us to simultaneously detect phosphorylation levels of multiple proteins in a single cell. During the last decade, phosphoflow has brought a new dimension to understand proteomics. Tim's nanocluster senor in exploring DNA methylation provides similar capabilities as phosphoflow in study protein phosphorylation. In addition, his 3-D single molecule tracking technique can provide spatial information in real-time. These techniques developed by Tim will be able to push the envelope of understanding cellular omics far beyond the current state of art.

In addition to his extraordinary accomplishments in research, Tim also has made impressive records in educating next generation engineers. His students have received more than 21 awards from conferences and professional societies. He has produced three PhDs and two PhD students in pipeline.

He has served on technical committees and chairs for many international conferences and reviewers for tens of high impact journals. Tim's services to the professional societies are more than adequate.

Tim is an exceptional leader in the field of Micro/Nano sensor. His research accomplishments and academic performances clearly indicate that he is moving toward a world-class scholar. I wholeheartedly support Dr. Tim Yeh for promotion to Associate Professor with tenure.

Sincerely yours,

Chih-Ming Ho
Distinguished Research Professor
Member, US National Academy of Engineering
Academician, Academia Sinica

Sunday, August 27, 2017 at 2:43:31 PM Central Daylight Time

Subject: (none)
Date: Tuesday, July 18, 2017 at 2:04:04 PM Central Daylight Time
From: CHIH-MING HO
To: Sakiyama-Elbert, Shelly E
CC: Cunningham, Carrie N
Attachments: Yeh-Tim- UT -Associate Prof.pdf, CM Ho -Bio-2017.pdf

Dear Shelly

The letter for Tim is attached.

visit our new website https://sites.google.com/g.ucla.edu/ho-lab-personalized-medicine

Sincerely yours,

Chih-Ming

Dr. Chih-Ming Ho
Distinguished Research Professor
Mechanical and Aerospace Engineering
Eng. IV, Rm 44-116-C
University of California, Los Angeles
Los Angeles, California 90095-1597

E-mail: chihming@g.ucla.edu
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Assistant: Kelli Yang
E-mail: Kelli@seas.ucla.edu

Chih-Ming Ho

Bio Sketch

After receiving his Ph.D. from Johns Hopkins University, Dr. Chih-Ming Ho started his career at the University of Southern California and rose to the rank of full professor. In 1991, he moved to the University of California, Los Angeles (UCLA) to lead the university's establishment of the micro-electro-mechanical-system (MEMS) field, while serving as the founding Director of the Center for Micro Systems. He held the Ben Rich-Lockheed Martin Professor Chair until he retired in 2016, and currently is a UCLA Distinguished Research Professor. Dr. Ho was the Director of the NASA supported Institute for Cell Mimetic Space Exploration (CMISE) and the NIH supported Center for Cell Control (CCC). He served as UCLA Associate Vice Chancellor for Research from 2001 to 2005.

His research interests include phenotypic personalized medicine (PPM), micro/nano fluidics, molecular sensors and turbulence. He was ranked by ISI as one of the top 250 most cited researchers in all engineering categories (2001-2014). In 1997, Dr. Ho was inducted as a member of the National Academy of Engineering. In the next year, he was elected as an Academician of Academia Sinica. He has received a Doctor of Engineering Honoris Causa from Hong Kong University of Science and Technology and Dr. Ho holds ten honorary professorships, including the Einstein Professor from the Chinese Academy of Sciences. Dr. Ho was elected a Fellow of APS, AAAS, AIMBE, AIAA and 3M-Nano Society.

In addition to his academic accomplishments, he has made extensive contributions to many professional societies around the world. He has chaired the Division of Fluid Dynamics (DFD) for the American Physical Society, which is the leading platform in the United States for scientists interested in fundamental fluid dynamics. He was on the advisory board for the AIAA Journal and is a member of the IEEE/ASME JMEMS coordinating Committee. He was an Associate Editor of the ASME Journal of Fluids Engineering and an Associate Editor of the AIAA Journal. He also has served as a Guest Editor for the Annual Review of Fluid Dynamics.

On the international level, he has served on advisory panels to provide assistance to many countries and regions, including China, France, Hong Kong, Israel, Japan, Korea, Switzerland, Taiwan, Thailand, and the United Kingdom on the developments of nano/micro technologies. Dr. Ho also has chaired or served on numerous organizing committees of international conferences on high technology topics.

Honors

Member: US National Academy of Engineering
Citation: For contributions to the understanding and control of turbulent flows.

Academician: Academia Sinica

Doctor of Engineering Honoris Causa: Hong Kong University of Science and Technology

Fellow: The American Association for the Advancement of Science (AAAS)
Citation: For pioneering contributions in phenotypic personalized medicine, microfluidics, bio-molecular sensing and control of turbulent flows

Fellow: American Institute of Medical and Biological Engineering (AIMBE)
Citation: Chih-Ming Ho has been elected a distinguished Fellow of the Institute for his seminal impacts made in the microfluidic system technology for applications in medical diagnosis and biological research

Fellow: American Physical Society (APS)
Citation: For contributions in understanding the sensitivity of free shear layer under perturbations or geometrical variations in initial conditions. His pioneering works have been served as bases for controlling the evolutions of turbulent free shear layers.

Fellow: American Institute of Aeronautics and Astronautics (AIAA)
Citation: For seminal contributions to the basic understanding and control of turbulent shear flows and for pioneering contributions to applying microtransducers to aerospace science.
Fellow: International Society for Nano Manipulation, Manufacturing and Measurement (3M-Nano)
Citation: For outstanding professional achievement in nano science and engineering

Awards

Distinguished Alumnus of National Taiwan University
Global Achievement Award: The Johns Hopkins University
The Johns Hopkins University Society of Scholars
UCLA-Allied Signal Faculty Research Award

Honorary Professorship

Ben Rich - Lockheed Martin Professor
Einstein Professor, Chinese Academy of Sciences
K. T. Lee Honorary Chair Professor of National Cheng Kung University
Honorary Research Professor of National Taiwan University
Kuo-Nien Honorary Professor of National Tsinghua University
Honorary Chair Professor of National Chao-Tung University
Honorary Chair Professor of National Tsinghua University
Honorary Professor of Institute of Mechanics, Chinese Academy of Sciences
Honorary Professor of Nanjing University of Aeronautics and Astronautics

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Prof. Tony Jun Huang
Department of Mechanical Engineering
and Materials Science
144 Hudson Hall
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Durham, NC 27708
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Tel: (919) 684-5728
Website: https://acoustofluidics.pratt.duke.edu/

July 22, 2017

To whom it may concern,

I am writing in the strongest and most enthusiastic support of Dr. Tim Yeh's tenure application to the Cockrell School of Engineering at the University of Texas at Austin. I met Tim several years ago for the first time at an international microfluidics conference. I also had read many of his excellent work on nanomedicine long before I met him in person. Everything I know of Tim suggests that he is a superstar in academia, and has already made significant impact in micro- nano-technologies in general, and most especially in the field of nanomedicine. I will detail below what I think some of his seminal contributions have been.

Whereas Tim's broad research interests cover nanomedicine, nanobiosensors, single-molecule biophysics, single-cell analysis, biomarker development, and advanced microscopy techniques, in the past 5 years he specifically focuses on the development of "enabling tools" that can be used by the biomedical community to address the fundamental questions in biology and medicine. For instance, Tim realized there was an urgent need to monitor the trafficking routes and dynamic patterns of important signaling receptors inside tumor spheroids. But limited by the available techniques, researchers had no good ways to track single receptors moving in these three-dimensional cancer models. In 2015, Tim published an original paper in *Nature Communications*, describing a whole new kind of custom-made, feedback-control, 3D single-molecule tracking microscope which he coined TSUNAMI (Tracking of Single particles Using Nonlinear And Multiplexed Illumination). This TSUNAMI microscope is truly revolutionary in several ways. First, not only does it achieve super-resolution in tracking receptor motions, but it also beats the conventional camera-based tracking systems in reaching ultrahigh temporal resolution. Second, TSUNAMI allows for fluorescence lifetime measurements on the tracked particles, which cannot be achieved by the conventional techniques. Third, the 3D tracking is achieved by using only one single-photon detector (while other competing techniques used 4-5 detectors) and its z-tracking range is not limited to the depth of focus. When Tim was invited to give a departmental talk at Penn State in March 2016 (I moved from Penn State to Duke in summer 2016), I was fascinated by this genius idea of "multiplexed illumination and demultiplexed detection", which enables TSUNAMI to rely on only one detector to discern the 3D position of a single particle. There is no double in my mind that this was a truly original work and from my conversation with Tim during his visit I realized that UT was applying for an international patent on this invention. I emphasize that we would have done the same thing if this TSUNAMI microscope was invented at Duke. Based on this enabling tool, Tim has successfully won NIH funding to support his research and collaborated with cancer researchers to study cancer biology. In 2016, Tim brought the 3D single-particle tracking to another level by publishing a theoretical paper in trajectory analysis in *Biophysical*

Journal. I am sure that Tim will continue to mature his imaging tools, create new analysis algorithm, answer fundamental questions in biology, and win more federal grants in the near future.

Tim is really famous for his original and seminal work in few-atom, fluorescent silver nanoclusters, a novel class of fluorescent nanoparticles that can be used to create new biosensors, which he collectively coined "NanoCluster Beacons". In 2010 Tim discovered a controllable and reversible color-switching property of silver nanoclusters templated on DNA, which brought him an article in *Nano Letters* (cited 342 times as of today), two US patents, and a *2011 R&D 100* award (as the primary developer). At UT, Tim continues to study this fascinating material that has great potential for biomedical applications. In 2014 he created a palette of colors of NanoCluster Beacons and published this work in *ACS Nano*. I was fascinated by the "short-range interactions" between silver clusters and nucleobases that Tim described and demonstrated in this *ACS Nano* article. I emphasize that this kind of interactions is never heard of, and I believe if these interactions can be elucidated and well controlled, many new multicolor sensors can be created. I have to say that Tim's articles are not only rigorous but also beautiful to read. Readers can easily capture the key ideas and understand the contribution and the novelty of the work. There is no double in my mind that Tim keeps a very high standard for himself and for his students. The analytical analysis of the silver clusters was beautifully carried out and the findings are truly novel. The good analogy of this work is the fluorescent protein palette that Roger Tsien created in 2007.

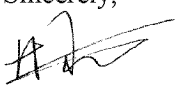
In 2015 Tim brought his NanoCluster Beacon sensing technique to another level by designing a probe that enables detection of a single N^6-methyladenine (m^6A) and published an article in *JACS*. This is again an "enabling and unique tool" that Tim has created. I emphasize that very few methods have been demonstrated so far for m^6A detection. Often called "the 6^{th} nucleotide", m^6A's role in mammals remains a mystery. Tim's work came at an exciting moment when researchers just began to unveil the novel epigenetic mechanisms of m^6A in eukaryotes and pointed out the possible epigenetic regulatory roles of m^6A in human cancers. However, studying m^6A is very difficult. Unlike bacterial genomes, the level of m^6A modification in human genome is so low that the traditional methods, such as HPLC-electrospray ionization tandem mass spectrometry, are unable to detect m^6A in human DNA. Unlike 5-methylcytosine (m^5C), there is no chemical treatment that can facilitate the m^6A detection. While we knew the presence of just a few hundreds of m^6A throughout the whole human genome can be sufficient to play a crucial role in controlling important biological processes such as tumor cell differentiation and marking immortal DNA in asymmetric division of adult stem cells, our understanding of m6A's roles in human cancers is poorly limited. This is mainly due to the fact that we lack an inexpensive, fast and reliable tool that can identify a single m^6A modification on a single DNA molecule. Tim has paved the way and elegantly demonstrated that such an m^6A sensor can be created using the novel fluorescent nanomaterials. In particular, the use of "3-way junction" geometry is truly innovative, which cleverly turns the environmental sensitivity property of silver clusters into a mechanism of sensing spatial alteration due to the addition of a methyl group. As Tim described in his talk, after he published his *JACS* paper he has been contacted by researchers around the world about using his sensors for m^6A detection on various genomes.

Regarding service, Tim has served as session organizing chair and technical program committee for a number of conferences, such as IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS), IEEE International Conference on Nano/Molecular Medicine & Engineering (IEEE-NANOMED), and BMES. I met Tim a few times at these conferences and enjoyed his sessions very much. He is really the one with very high standard, with his speech and questions often inspiring to students and other researchers. His service to NSF review panel and journal peer review are also outstanding.

Regarding teaching, Tim has been recognized by a 2016 Outstanding Faculty Award from the Cockrell School of Engineering and the Student Engineering Council at UT Austin. My understanding is there is only one person selected from each department to receive this prestigious teaching award every year. I have heard about this award from my student Yuebing Zheng (currently an assistant professor in the mechanical engineering at UT Austin) and understood that a junior faculty member like Tim must have put tremendous effort in his teaching in order to receive such an award. When Tim gave his talk in my department, I was amazed to see how articulate he was (as a non-native speaker) in explaining the concept behind the scene to our faculty and students. Not only myself, many of my colleagues felt that Tim's talk was the best one that they have heard in that season.

From my perspective, Prof. Yeh has clearly achieved national renown for his pioneering work on nanobiosensors and nanomedicine. His performance as an engineering professor has been spectacular, and while I do not have a crystal ball, his future potential looks even more brilliant from my perspective. In my opinion, Prof. Yeh is a high-energy, brilliant scholar and educator that the United States needs to carry on and advance science and engineering to the next level. Therefore, I strongly support without any hesitation that his being awarded with the rank of tenured Associate Professor at UT. Your favorable consideration is highly appreciated.

Sincerely,



Tony Jun Huang
Professor of Mechanical Engineering and Materials Science (MEMS)
Pratt School of Engineering
Duke University

Sunday, August 27, 2017 at 2:44:19 PM Central Daylight Time

Subject: [UTEXAS: ATTACHMENT UNSCANNED] RE: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Monday, July 24, 2017 at 1:59:11 PM Central Daylight Time
From: Prof Tony Huang, Ph.D.
To: Cunningham, Carrie N
CC: Sakiyama-Elbert, Shelly E
Attachments: Tim Yeh-Huang Letter.pdf, NSF Bio Sketch-Huang.doc

Dear Carrie and Shelly,

Attached is my letter. Sorry for being late.

Tony

Tony Jun Huang
Professor of Mechanical Engineering and Materials Science (MEMS)
Pratt School of Engineering
Duke University
Tel: (919) 684-5728
Email: tony.huang@duke.edu
Group Website: https://acoustofluidics.pratt.duke.edu/
ResearcherID: http://www.researcherid.com/rid/A-1546-2009
Google Scholar: https://scholar.google.com/citations?user=j2PH0Y0AAAAJ&hl=en

Mailing address: 144 Hudson Hall, Box 90300, Durham, NC 27708
Office location: B330B Levine Science Research Center

From: Cunningham, Carrie N [mailto:carrie.c@austin.utexas.edu]
Sent: Monday, July 10, 2017 12:05 PM
To: Prof Tony Huang, Ph.D. <tony.huang@duke.edu>
Cc: Sakiyama-Elbert, Shelly E <sakiyama@utexas.edu>
Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Importance: High

Just a friendly reminder of the request below for a letter for Dr. Hsin-Chih “Tim” Yeh’s promotion to Associate Professor at The University of Texas at Austin.

If you are still able to assist, please advise when you might be able to provide a letter. We do have some flexibility on the deadline. We greatly appreciate your assistance with this process.

Best,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

---

From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:19 PM
To: "tony.huang@duke.edu" <tony.huang@duke.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Huang,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

Tony Jun Huang

Professional Preparation

Xi'an Jiaotong University, China	Mechanical Engineering	B.S.	1996
Xi'an Jiaotong University, China	Mechanical Engineering	M.S.	1999
University of California, Los Angeles	Mechanical Engineering	Ph.D.	2005
University of California, Los Angeles	Mechanical Engineering	Postdoc	3/2005–8/2005

Appointments

2016–present:	Professor of Mechanical Engineering and Materials Science (MEMS) Duke University
2013–2016:	Professor and the Huck Distinguished Chair in Bioengineering Science and Mechanics, The Pennsylvania State University
2010–2013:	Associate Professor of Engineering Science and Mechanics, The Pennsylvania State University
2005–2010:	James Henderson Assistant Professor of Engineering Science and Mechanics, The Pennsylvania State University

Products (183 journal publications; >10,000 citations at Google Scholars; h-index: 55)

(i) Five products most closely related to the project

1. Guo F, Mao Z, Chen Y, Xie Z, Lata JP, Li P, Ren L, Liu J, Yang J, Dao M, Suresh S and **Huang TJ**, Three-dimensional Manipulation of Single Cells Using Surface Acoustic Waves, *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, Vol. 113, pp. 1522-1527, 2016.
2. Ahmed D, Ozcelik A, Bojanala N, Nama N, Upadhyay A, Chen Y, Hanna-Rose W, and **Huang TJ**, Rotational manipulation of single cells and organisms using acoustic waves, *Nature Communications*, Vol. 7, pp. 11085, 2016.
3. Guo F, Li P, French JB, Mao Z, Zhao H, Li S, Nama N, Fick JR, Benkovic SJ, and **Huang TJ**, Controlling Cell-Cell Interactions using Surface Acoustic Waves, *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, Vol. 112, pp. 43–48, 2015.
4. Ding X, Peng Z, Lin S, Geri M, Li S, Li P, Chen Y, Dao M, Suresh S, and **Huang TJ**, Cell Separation Using Tilted-Angle Standing Surface Acoustic Waves, *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, 111:12992-12997, 2014.
5. Ding X, Lin SS, Kiraly B, Yue H, Li S, Shi J, Benkovic SJ, and **Huang TJ**, On-Chip Manipulation of Single Microparticles, Cells, and Organisms Using Surface Acoustic Waves, *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, 109:11105-11109, 2012.

(ii) Five other significant products

1. Chen Y, Li S, Gu Y, Li P, Ding X, McCoy JP, Levine SJ, Wang L, and **Huang TJ,** Continuous enrichment of low-abundance cell sample using standing surface acoustic waves (SSAW), *Lab on a Chip,* 14:924-930, 2014.
2. Zhao C, Liu Y, Zhao Y, Fang N, and **Huang TJ**, A Reconfigurable Plasmofluidic Lens, *Nature Communications*, 4:2305, 2013.
3. Ding X, Lin SS, Lapsley MI, Li S, Guo X, Chan CY, Chiang IK, McCoy JP, and **Huang TJ**, Standing Surface Acoustic Wave (SSAW) Based Multichannel Cell Sorting, *Lab on a Chip*, Vol.12, pp. 4228–4231, 2012.

4. Ding X, Li P, Lin S, Stratton ZS, Nama N, Guo F, Slotcavage D, Mao X, Shi J, Costanzo F, and **Huang TJ**, Surface Acoustic Wave Microfluidics, *Lab on a Chip*, 13:3626-3649, 2013.
5. Shi J, Ahmed D, Mao X, Lin SS, and **Huang TJ**. Acoustic Tweezers: Patterning Cells and Microparticles Using Standing Surface Acoustic Waves (SSAW), *Lab on a Chip* 9: 2890-2895, 2009.

Synergistic Activities

1. Huang was elected a fellow of the following five professional societies: the American Institute for Medical and Biological Engineering (AIMBE), the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the Institute of Physics (IOP), and the Royal Society of Chemistry (RSC). His work have been recognized with awards and honors such as a 2010 National Institutes of Health (NIH) Director's New Innovator Award, a 2011 JALA Top Ten Breakthroughs of the Year Award, a 2012 Outstanding Young Manufacturing Engineer Award from Society for Manufacturing Engineering, a 2013 Faculty Scholar Medal from The Pennsylvania State University, a 2013 American Asthma Foundation (AAF) Scholar Award, the 2014 IEEE Sensors Council Technical Achievement Award, and the 2017 Analytical Chemistry Young Innovator Award.
2. Huang has served as a member of the Editorial/Advisory Boards at nine different journals including *Scientific Reports, Lab on a Chip, IEEE Sensors Journal*, and *Journal of Laboratory Automation*. He is a guest editor at *Proceedings of the National Academy of Sciences (PNAS)* and *International Journal of Engineering Education*.
3. Huang has served as Vice Chair of the American Society of Mechanical Engineers (ASME) Nanotechnology Council and Chair of the organizing committee for the ASME Micro/Nano Technology Forum; and he has organized symposia, conferences and topical sessions for ASME, IEEE, and Biomedical Engineering Society (BMES).
4. Thirty-seven journal articles authored by Huang and his students have been featured as cover articles at journals such as *Advanced Materials, Applied Physics Letters*, and *Lab on a Chip*; his research has been highlighted at *NSF (11 times), NIH,* and more than 1000 public media such as *US News and World Report, MSNBC, Yahoo News, Popular Science, Live Science, Popular Mechanics, Science Daily,* and *R&D Magazine*.
5. Huang has given more than 90 plenary/keynote/invited talks at conferences/institutions in the US, China, UK, Canada, Germany, Denmark, Switzerland, Sweden, France, and Japan.

Collaborators & Other Affiliations

(a) Collaborators and Co-Editors

Stephen Benkovic (Penn State), Peter Butler (Penn State), Vincent Crespi (Penn State), Jarrod French (Stony Brook), William A. Goddard (Caltech), Chih-Ming Ho (UCLA), Lasse Jensen (Penn State), IC Khoo (Penn State), Kam Leong (Duke), Stewart Levine (NIH), Chung-Chiun Liu (Case Western), Wei Lu (UMich), Philip McCoy (NIH), J. Fraser Stoddart (Northwestern), Bernhard Tittmann (Penn State), Paul S. Weiss (UCLA)

(b) Graduate Advisors and Postdoctoral Sponsors

Wenquan Tao, Xi'an Jiao Tong University, China
Chih-Ming Ho, University of California, Los Angeles (UCLA)

(c) Thesis Advisors and Postgraduate-Scholar Sponsor (33 graduate students & 10 postdocs)

V. Hsiao (National Chi Nan Univ, Taiwan), Y. Liu (A-Star, Singapore), Y. Zheng (UT Austin), X. Ding (MIT), C. Zhao (NIST), J. Shi (GE Global Research), Q. Hao (Micron Technology), B. Kiraly (Northwestern Univ), X. Mao (P&G), B. K. Juluri (Pacific Integrated Energy), S. Lin (Illumina), M. Lapsley (QBC Diagnostics), P. Li (PSU), S. Yang (PSU), D. Ahmed (PSU), M. Lu (PSU), Y. Zhao (PSU), A. A. Nawaz (PSU), Y. Xie (PSU), S. Li (PSU), Z. Mao (PSU), F. Guo (PSU), P. Huang (PSU), K. Chan (PSU), Y. Chen (PSU), N. Nama (PSU), A. Ozcelik (PSU)

UNIVERSITY OF CALIFORNIA, IRVINE BC

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THE HENRY SAMUELI SCHOOL OF ENGINEERING
Department of Biomedical Engineering

3120 Natural Sciences II
Irvine, CA 92697-2715

April 21st, 2017

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering
Department of Biomedical Engineering
107 W. Dean Keeton St. • Austin, Texas 78712-0238

Dear Professor Sakiyama-Elbert,

I am writing to provide my review and evaluation of Prof. Hsin-Chih "Tim" Yeh's scholarly research and professional accomplishments towards the promotion to Associate Professor with tenure in the Faculty of Biomedical Engineering. This will include the review of his past research accomplishments and the projections of his research potential into the future. Finally, I will try and compare him with peers in the field in terms of achievement, potential, and leadership impact.

Before providing my evaluation, although my research area and Prof. Yeh's do overlap, the core areas are different so I am not as familiar with the state-of-the-art developments and all the leading experts in the field. However, I will use my broad experience as a researcher, an administrator, and a teacher to give my perspectives. After a careful review of his promotion files, I believe Prof. Yeh demonstrated scholarly achievements commensurate with what is expected at the level of Associate Professor with tenure. I will elaborate below.

During his time as an Assistant Professor, he has developed a focused research program on nanobiosensors based on nanomaterials as molecular probes. These molecular probes are able to monitor molecular events in 3-D multicellular tissue that could shed light on the complex biology for insight into disease diagnosis and treatment. These can be powerful tools for the broader biomedical community to adopt and that is why he is able to publish in fairly high impact journals. Based on his file, Prof. Yeh has developed expertise in biomolecular imaging and sensing, and this requires biochemistry, genetic analysis, biotechnologies, and instrument development. The latter includes biological sample preparation and optics measurement systems design. I believe these skills will provide him a platform to be versatile in attacking biological and biomedical problems, as he can develop the tools to study new biological questions. Furthermore, it is clear that he is very collaborative, which is required in today's research environment since big problems are solved by multi-member teams. He has several co-first author and co-corresponding author papers with his collaborators (also are collaborators on grants). With both a desirable and versatile skillset and a collaborative mindset towards research, I believe Prof. Yeh can continue to make strong contributions to his field. His performance is solid, with 17 journal papers in mostly high impact venues (e.g. Analytical Chemistry, ACS Nano, Nano Letters, JACS, etc.). It seems that Prof. Yeh has turned the corner in terms of garnering funding for his research, having been awarded two major awards in the last two years totaling about $1M (one NIH, one NSF). This is likely due to his publications now have given evidence of the functionality, performance, and significance of his research. This is always a good sign for junior faculty going up for tenure, that the trajectory is upward with strong potential of further expansion. Professor Yeh compares comparably with others that I have reviewed at research universities that went on to receive tenure and are doing excellently after promotion. The ability to define more significant biomedical problems that his probes can tackle would be the key for his further advancement in the research field. Some similar comparisons include Prof Moran Bercovici at Technion - Israel Institute of Technology, or Prof. Carlotta Guiducci at EPFL in Switzerland. I believe all three are similar in their focused efforts and ability to expand in different directions based on their established core competencies.

In summary, both the quality and quantity of Prof. Yeh's research output are evidence of an emerging high quality research program. There are ample reasons to believe his research will continue to flourish and expand in the near future. The nature of his research is heavy in molecular probe design and biophotonic engineering, and should have potential for both fundamental scientific discoveries and technological advances. I am confident he would have no problem receiving tenure promotion at our university and other research intensive universities in the country.

Please let me know if you have any further questions regarding my reference letter.

Best Regards,

Abraham Lee, Ph.D.
William J. Link Professor and Chair of Biomedical Engineering

P.S. I first met Prof. Yeh when he was a senior PhD student at Johns Hopkins University as his advisor was part of the research center that I directed (MF3). I have not had much interactions with him during his tenure at UT Austin since we are in slightly different research fields.

Sunday, August 27, 2017 at 2:45:59 PM Central Daylight Time

Subject: FW: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Tuesday, July 25, 2017 at 8:05:45 AM Central Daylight Time
From: Sakiyama-Elbert, Shelly E
To: Cunningham, Carrie N
Attachments: Yeh_Tim_tenure_promotion_letter.pdf

--
SHELLY SAKIYAMA-ELBERT, Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering |
512.471.3604 | www.bme.utexas.edu

From: Abraham Lee <aplee@uci.edu>
Date: Monday, July 24, 2017 at 11:22 PM
To: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Shelly,

Attached please find my reference letter for Dr. Tim Yeh.

Hope this is helpful!

Best,
Abe

Abraham "Abe" Lee, Ph.D.
William J. Link Professor and Chair
Department of Biomedical Engineering (BME)
Professor, Mechanical Engineering
Director, NSF I/UCRC CADMIM
Research Lab: Biomolecular Microsystems and Nano Transducers (BioMiNT)
University of California at Irvine
(office) 3120 Natural Sciences II, Irvine, CA 92697-2715
phone: (949) 824-8155, -9691
Editor-in-Chief, Lab on a Chip

Please join us in Savannah for microTAS 2017!

On Jul 12, 2017, at 10:16 AM, Sakiyama-Elbert, Shelly E <sakiyama@utexas.edu> wrote:

Dear Abe,

Thank you very much! We can extend the deadline (originally 7/14) by 1-2 weeks if you need extra time.

Shelly

--
SHELLY SAKIYAMA-ELBERT, Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering |
512.471.3604 | www.bme.utexas.edu

From: Abraham Lee <aplee@uci.edu>
Date: Tuesday, July 11, 2017 at 5:49 PM
To: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Shelly,

Got it. I will be happy to provide my letter evaluating Dr. Yeh as a BME chair and with general expertise in his area.

Best,
Abe

Abraham "Abe" Lee, Ph.D.
William J. Link Professor and Chair
Department of Biomedical Engineering (BME)
Professor, Mechanical Engineering
Director, NSF I/UCRC CADMIM
Research Lab: Biomolecular Microsystems and Nano Transducers (BioMiNT)
University of California at Irvine
(office) 3120 Natural Sciences II, Irvine, CA 92697-2715
phone: (949) 824-8155, -9691
Editor-in-Chief, Lab on a Chip

Please join us in Savannah for microTAS 2017!

On Jul 11, 2017, at 2:45 PM, Sakiyama-Elbert, Shelly E <sakiyama@utexas.edu> wrote:

Dear Abe,

I think it would be very beneficial to have a letter from you as a BME chair. If you would like to express the

caveat about not being in the same immediate field, your expertise reviewing many promotion cases in the field would be very valuable. Any declinations are viewed in a somewhat negative light as the case progresses further from the department.

Thank you for your consideration.

Best regards,
Shelly

--
SHELLY SAKIYAMA-ELBERT, Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering |
512.471.3604 | www.bme.utexas.edu

From: Abraham Lee <aplee@uci.edu>
Date: Tuesday, July 11, 2017 at 2:56 PM
To: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Carrie,

I am terribly sorry for this late reply due to constant traveling and various commitments crowded together...

Just today I was able to look at this reference in more detail. I think Dr. Yeh has done very well based on the track record and I think he deserves promotion. However, my expertise is outside of his primary research field and believe someone with more nanomedicine/photonics background would be more suitable to write an in depth reference letter, something you would need for the promotion review committee. In general Dr. Yeh and I don't publish in the same journals nor go to the same conferences. Since I do write a large number of letters each year, I am a little more selective to make sure the letters I write are most impactful and useful for the cases being considered. It by no means reflects on Dr. Yeh's level of accomplishments and progress towards tenure promotion. If the absence of my letter would be construed as a negative to Dr. Yeh, then I would make an effort to write the letter with the caveat that I am not able to be comprehensive in evaluating the state-of-art in his research field.

Thanks again for inviting me to be a reference. Please let me know what you decide.

Best,
Abe

Abraham "Abe" Lee, Ph.D.
William J. Link Professor and Chair
Department of Biomedical Engineering (BME)
Professor, Mechanical Engineering
Director, NSF I/UCRC CADMIM
Research Lab: Biomolecular Microsystems and Nano Transducers (BioMiNT)
University of California at Irvine
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phone: (949) 824-8155, -9691
Editor-in-Chief, Lab on a Chip

Please join us in Savannah for microTAS 2017!

On Jul 10, 2017, at 9:05 AM, Cunningham, Carrie N <carrie.c@austin.utexas.edu> wrote:

Just a friendly reminder of the request below for a letter for Dr. Hsin-Chih "Tim" Yeh's promotion to Associate Professor at The University of Texas at Austin.

If you are still able to assist, please advise when you might be able to provide a letter. We do have some flexibility on the deadline. We greatly appreciate your assistance with this process.

Best,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

---

From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:19 PM
To: "aplee@uci.edu" <aplee@uci.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Lee,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include

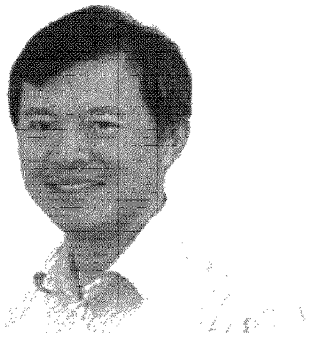
a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu



Abraham Lee

Chair
Biomedical Engineering

William J. Link Professor
Biomedical Engineering

Professor (Joint Appointment)
Mechanical and Aerospace Engineering

Director
Micro/Nano Fluidics Fundamentals Focus Center

Director
Center for Advanced Design and Manufacturing of Integrated Microfluidics

Location:
Office: 3120 Natural Sciences II
Research Office: 3406 Engineering Hall

Email:
aplee@uci.edu

Phone:
(949) 824-8155 BME Chair's Office

(949) 824-9691 Research Office

Fax:
(949) 824-1727

Address:
The Henry Samueli School of Engineering
University of California, Irvine
Irvine, CA 92697-2715

ZOT Code:
2715

Research:

Professor Abraham "Abe" Lee's research interest focuses on the development of integrated micro and nano fluidic chip processors for the manipulation and self-assembly of biomolecules and other synthesized nanoparticles. These integrated chip processors will also be designed for the sample preparation of biological fluids to extract the required ingredients for on-chip transducers. Applications for these fluidic processors include programmable precision production of biological reagents for nanomedicine, biomolecular nanosystems that utilize biophysics principles, and platforms to perform controlled studies of molecule-molecule/cell-molecule interactions.

With the research community's recent focus on nanotechnology, nanotransducers with unique functions are being developed for various biological applications. Examples include quantum dots for molecular beacons, synthetic peptides to mimic cellular functions, carbon nanotubes for electronic detection of biomolecules, DNA-based transducers produced by directed self-assembly, and liposomes for targeted drug delivery. Most of these "nanotransducers" are generated by batch mixing of chemicals and reagents, limiting the yield and requiring larger volumes of reagents than necessary. They are also mostly limited to single functions and components research with little or no integration and scale-up. However, to truly unveil biological events such as cell signaling pathways, genetic mutation processes, or the immune responses to pathogens, one must have a method to generate large-scale, multifunctional nano-bio interfaces with readout and control. Professor Lee's research group is developing integrated microfluidic platforms with the goal of generating programmable synthesis of multifunctional nanotransducers.

Current integrated microfluidic devices lack the capability to locally control flow inside the microchannels. It is also difficult to implement fluidic circuits that exploit critical interfacial forces in biological cells with an ultimate goal to function at the complexity of biomolecular interactions. One of our approaches is to develop microfluidic devices based on the principle of "Lorentz" forces to develop "magnetohydrodynamic (MHD) microfluidic systems". This platform can incorporate complex microfluidic components such as pumps, valves, and flow sensors on a general microfabrication platform. It can also enable complex microfluidic circuits with local flow control to be established without the need of external fluidic control

manifolds. The MHD microfluidic systems will be implemented with innovative polymeric microfabrication processes.

Other research interests of professor Lee include microtools for real-time, minimally invasive therapy and imaging of the brain and micro devices for distributed surveillance in liquid-based environments.

Links:

http://biomint.eng.uci.edu/

Micro/Nano Fluidics Fundamentals Focus Center

Contact Us

Samueli School of Engineering
5200 Engineering Hall
Irvine, CA
92697-2700
+1-949-824-4333

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Undergraduate Student Affairs
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Candidate

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK
DEPARTMENT OF BIOMEDICAL ENGINEERING

August 6, 2017

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering
Department of Biomedical Engineering
The University of Texas at Austin
107 W. Dean Keeton St.
Austin, Texas 78712-0238

Dear Professor Sakiyama-Elbert:

It is my pleasure to provide a reference for the consideration of promoting Dr. Hsin-Chih "Tim" Yeh to the rank of Associate Professor in the Department of Biomedical Engineering at UT Austin with tenure.

As a researcher in biomaterials, gene delivery, and tissue engineering, I have followed the work of Dr. Yeh from a distance with admiration. I first learned of Dr. Yeh from my collaborator Jeff Wang at Johns Hopkins University, who is the PhD mentor of Tim. Jeff raved about the brilliance of one of this graduate students, who turned out to be Tim. Dr. Yeh is an innovative biomedical engineer who has made important contributions to the field of fluorescent nanomaterials for biomedical applications.

On research, the work of Dr. Yeh is marked by innovation. He has excelled in developing noble metal nanoclusters as low-cost nanoprobes for bioimaging, applicable to detection of nucleic acid methylation, enzyme activity, and single-nucleotide polymorphism. I will describe one of his contributions to highlight his creativity. Rolling Circle Enhanced Enzyme Activity Detection (REEAD) is a powerful technique to detect endogenous enzyme activity at the single catalytic-event level. Current REEAD assays rely on organic dye-tagged linear DNA probes to report the rolling circle amplification products (RCPs), the cost of which may hinder the widespread use of REEAD. Tim developed a new class of activatable probes, NanoCluster Beacons (NCBs), that can simplify the REEAD assays by eliminating the need for purification; they can also markedly enhance the fluorescence intensity upon hybridization. These NCBs are cost-effective and sensitive, rendering REEAD-based diagnostics attractive for a wide variety of isothermal amplification assays.

The productivity of Dr. Yeh is respectable, publishing 15 peer-reviewed manuscripts after joining UT Austin, with most of them in the top-tier journals of chemistry and nanotechnology, such as *Nature Communications, Biomaterials, ACS Nano, Analytical Chemistry, and Nanoscale.* Dr. Yeh is enjoying a growing international reputation as reflected by the number of invited lectures (20 total) he has given recently in universities and international conferences. Dr. Yeh is also enjoying a good level of funding. He has received funding as the lead PI from both federal

351 Engineering Terrace Mail Code 8904 1210 Amsterdam Avenue New York, NY 10027

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK
DEPARTMENT OF BIOMEDICAL ENGINEERING

and private funding agencies, including NIH (RO1) and NSF. This bodes well for sustaining the excellence of his research program.

On teaching and service, Dr. Yeh has done his fair share. He has graduated three PhD students, mentored one postdoctoral fellow and advised a good number of undergraduate students. He has chaired sessions in conferences, served as a reviewer for many journals, and served on many thesis committees and proposal review panels.

In summary, Dr. Yeh has developed enabling molecular tracking technologies that can impact disease diagnosis and therapy. He is projecting a scientific future that is marked by excellence. I have been a faculty in the biomedical engineering departments of Johns Hopkins, Duke and now Columbia. Comparing Dr. Yeh with the faculty who have been tenured as associate professors in those departments, I would speculate that Dr. Yeh would also be tenured in those institutions without difficulty. Dr. Yeh possesses the essential qualities worthy of a tenured professorship: creativity and productivity. This is a scientist and faculty member who has represented UT Austin well in the past five years. I support his promotion with great enthusiasm.

Sincerely,

Kam W. Leong, Ph.D.
Samuel Y. Sheng Professor
Department of Biomedical Engineering
Department of Systems Biology
Editor-in-Chief, *Biomaterials*

351 Engineering Terrace Mail Code 8904 1210 Amsterdam Avenue New York, NY 10027

Sunday, August 27, 2017 at 2:46:22 PM Central Daylight Time

Subject: Re:Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Sunday, August 6, 2017 at 11:29:47 AM Central Daylight Time
From: kamleongcolumbia
To: Sakiyama-Elbert, Shelly E
CC: kwl2121@columbia.edu, Cunningham, Carrie N
Attachments: Letter for Tim Yeh 2017.pdf

Please find attached the letter requested for Dr. Tim Yeh. Thank you for the patience,

--
Kind regards,
Kam

Kam W. Leong | *Samuel Y Sheng Professor* | EiC, *Biomaterials*
Department of Biomedical Engineering | Systems Biology
Columbia University, and Columbia University Medical Center
New York, NY 10032
Preferred email: kam.leong@columbia.edu

At 2017-07-27 21:48:45, "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu> wrote:

Thank you! If you could send it by Wed. 8/2 that would be fine.

Shelly

--

SHELLY SAKIYAMA-ELBERT, Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering |
512.471.3604 | www.bme.utexas.edu

From: kamleongcolumbia <kamleongcolumbia@vip.163.com>
Date: Wednesday, July 26, 2017 at 5:02 PM
To: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Cc: "kwl2121@columbia.edu" <kwl2121@columbia.edu>, "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Subject: Re:Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Shelly, and Carrie

Please excuse this tardy response. Of course I will provide the reference letter. I have been traveling and swamped by other deadlines. Can I send the letter in a week or so? Thank you for the patience,

Kam
--

At 2017-07-25 07:52:24, "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu> wrote:

Dear Kam,

I hope you are well and enjoying the summer. I am following up on a request write a letter of evaluation for Tim Yeh. The original request is below. We are trying to get all the letters back for departmental review **by 7/31,** if possible. Please let me know if you are able to assist with this review.

Thank you!!

Best,
Shelly

--
SHELLY SAKIYAMA-ELBERT, Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering |
512.471.3604 | www.bme.utexas.edu

From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:19 PM
To: "kwl2121@columbia.edu" <kwl2121@columbia.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>

Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Leong,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Carrie

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

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[BULLETIN]

GO

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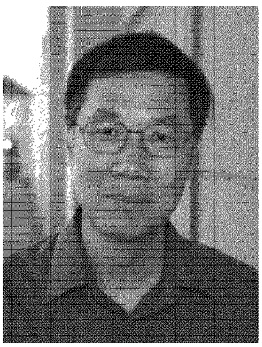

Kam W Leong

Samuel Y. Sheng Professor of Biomedical Engineering

351 Engineering Terrace
1210 Amsterdam Avenue, Mail Code: 8904
New York, NY 10027

Phone:
Fax: +1 212-854-8725
Email: kwl2121@columbia.edu
(mailto:kwl2121@columbia.edu)

Research Areas:

Regenerative Medicine with Direct Cellular Reprogramming.

Nanotherapeutics and Stem Cell Engineering Laboratory
(http://orion.bme.columbia.edu/leonglab/)

Direct cellular reprogramming, or transdifferentiation, where adult cells are converted from one lineage to another lineage without going through an intermediate stem cell-like stage, represents the next frontier of regenerative medicine or tissue engineering. An example would be the direct conversion of adult cells such as fibroblasts or endothelial cells into functional neurons.

Neurodegenerative diseases are responsible for an enormous proportion of global morbidity and mortality. There are currently no effective treatment options. Neurodegenerative disorders such as Alzheimer's and Parkinson's disease are characterized by extensive cell death: loss of neurons in the neocortex and hippocampus in the case of Alzheimer's and loss of dopaminergic (DA) neurons in the substantia nigra in the case of Parkinson's. Cell replacement therapy is an attractive long-term alternative to pharmacologic intervention or deep brain electrical stimulation. However, procurement of the appropriate cells for therapy has long been a challenge. Embryonic stem cells (ESC) can be differentiated into functional neurons but safety and ethical issues are significant barriers. Induced pluripotent stem cells (iPSC) can sidestep the ethical issues but the risk of teratoma formation persists. The generation of a safe source of autologous human neurons, by direct cellular reprogramming, would represent a transformative cell therapy against intractable neurodegenerative diseases.

So far all the success on direct cellular reprogramming has mostly been achieved by viral delivery. We focus on nonviral delivery approach to facilitate clinical translation. The overall objective of our research program is to systematically investigate and optimize the biochemical and physical cues dictating direct cellular reprogramming. In particular we will do so by leveraging on biomaterials and biomedical engineering techniques and innovations.

Penn Engineering

Candidate

School of Engineering and Applied Science
Department of Bioengineering
240 Skirkanich Hall
210 South 33rd Street
Philadelphia, PA 19104-6321
Tel 215.898.8501 Fax 215.573.3155

Shelly Sakiyama-Elbert, Ph.D
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering

July 9, 2017

Dear Dr. Sakiyama-Elbert,

I am happy to provide an evaluation of Dr. Hsin-Chih "Tim" Yeh's qualifications for promotion to Associate Professor with Tenure in the Department of Biomedical Engineering at the University of Texas at Austin. The research focus of Dr. Yeh's lab involves the development of new nanotechnologies and their utilization as biosensors for the detection and/or imaging of biomolecules at the single molecule to single cell level. Dr. Yeh has also been heavily involved in the development and evaluation of a 3D single molecule-tracking microscope that has provided unique insight into the internalization, transport and signaling dynamics of nanoparticles into living cells. I have been working as an independent investigator in the fields of nanomedicine, molecular imaging and targeted therapeutics at the University of Pennsylvania for ~13 years, where I am now a Professor of Bioengineering and Co-Director of the Center for Targeted Therapeutics and Translational Nanomedicine. During this time I have reviewed a wide range of grants, manuscripts, faculty applications, and tenure cases related to this topic. Therefore I feel I that I am qualified to comment on the technical and conceptual aspects of Dr. Yeh's research, as well as its impact. I have never worked directly with Dr. Yeh in any capacity; however, since we work within the same discipline, I have become very familiar with his work through presentations, publications, interactions at national conferences, and seminar visits. Our interactions date back to around 2013-2014.

I will first comment on the scholarship activities and the impact of Dr. Yeh's work to date. Since joining UT Austin, Dr. Yeh has been involved with developing a unique nanotechnology that he refers to as a NanoCluster Beacon. The NanoCluster Beacon consists of DNA-templated silver clusters that Dr. Yeh has engineered to exhibit a diverse range of emission colors by altering the number of cytosines in the cluster-nucleation sequence. This is a very intriguing nanotechnology that is very unique to Dr. Yeh's lab and thus he has become widely recognized for this work. Dr. Yeh has transformed these NanoClusters into very sensitive and highly specific biosensors by taking advantage of the sensitivity of the fluorescence emission to the nucleobase environment. This has allowed Dr. Yeh to explore some very interesting applications, including the detection of DNA methylation, DNA modifying enzymes, and single nucleotide polymorphisms. Dr. Yeh has performed very comprehensive studies on NanoClusters, which has been published in a variety of high impact journals, including ACS Nano, Journal of the American Chemical Society, and NanoScale.

In addition to his work in the field of nanotechnology, Dr. Yeh has also made quite an impact in the

field of single molecule microscopy through his work on 3D tracking of single particles using nonlinear multiplexed illumination (TSUNAMI), which he first described in Nature Communications in 2015. Since then, Dr. Yeh has made great strides in advancing this technology and demonstrating the utility of TSUNAMI in single molecule tracking in living cells, in solution, and in tumor spheroids. A notable feature of all of Dr. Yeh's work is his thoroughness and attention to detail. This instills a great deal of confidence in the findings that are reported and provides a nice contrast to the majority of the work in the field that is obviously often rushed into publication without being carefully scrutinized or sufficiently investigated. Because of the quality of Dr. Yeh's work, he has gained a great deal of respect from his colleagues and peers. I know the Penn faculty were particularly impressed with Dr. Yeh's seminar when he visited in 2016. Therefore, I believe that Dr. Yeh is on an excellent trajectory for continued success and recognition. Overall, Dr. Yeh's productivity has been very good, with a total of 35 peer-reviewed publications and 16 publications since joining UT Austin. This is very respectable and as good or better than others that have earned tenure at peer institutions. It should be noted that Dr. Yeh routinely publishes his work in well-respected and established journals, which is a testament to the quality of his published work. Several pending and awarded patents have also stemmed from Dr. Yeh's working, which is suggestive of its originality and utility.

Dr. Yeh appears to be reaching a very broad scientific community through conferences and invited presentations. Dr. Yeh has been exceptionally active in this area, with a significant number of speaker engagements distributed throughout the country as well as internationally. This is consistent with Dr. Yeh's friendly and outgoing personality, making him well liked and respected amongst his peers.

In regards to Dr. Yeh's funding, he has had some success, with one grant from the NIH and one from the NSF. This is in addition to a fairly significant grant from the Welch Foundation and several smaller grants from Texas 4000. While this is not earth shattering, this is on par with what I have seen from many others going up for tenure. Unfortunately, NIH funding levels are so low at the present time that Dr. Yeh's ability to even obtain funding and diversify his funding sources is probably a good sign. Based on Dr. Yeh's scientific record, I believe that he is deserving of more NIH funding and I hope that his funding will catch up to his science and that he will be able to further expand his research program.

In addition to conducting highly respected research, Dr. Yeh also seems to be strongly committed to undergraduate and graduate student research and service at UT Austin. In particular, Dr. Yeh has participated as a speaker and/or a judge for a large number of student events. He has also sat on significant number of thesis committees and has been active in mentoring a large number of undergraduate and high school students in his lab. I believe this clearly shows that Dr. Yeh is passionate about student education and the student experience.

Dr. Yeh also has a good record of assisting with departmental and school service. In particular, he has been involved with the award committee, graduate study committee, seminar committee, international graduate admission committee and others. This is at or above average for an Assistant Professor at peer institutions and is more than enough. In my opinion, Assistant Professors should be shielded from too many service commitments and should be given time to focus on their research program.

In my view, faculty promotion to the Associate Professor level is based on both accomplishments and future promise. Accomplishments are easier to assess, as we have all developed our own metrics on how to evaluate a person's productivity. Dr. Yeh has published a very strong base of papers and has acquired respect for the quality of his work. The second aspect I mention - promise and potential for success in the future - is much more difficult. Simply put, one can never truly predict the future.

However, one of the factors that I weigh when viewing promotion cases is the research area of an individual and the perseverance shown in reaching this point in their career. I would say that Dr. Yeh is clearly working in an exciting area with tremendous future potential. It is well known that nanotechnology and single molecule tracking offers a great deal of promise to deepen our understanding of biology, so there is no lack of interest. The detailed and thoroughness of the work that Dr. Yeh has published is a testament to his perseverance and dedication. Dr. Yeh has also displayed a great deal of creativity and innovation and for these reasons I have an exceptionally bright view of Dr. Yeh's potential. Further taking into account that Dr. Yeh was awarded the 2016 Outstanding Faculty Award for the BME Department, I think his colleagues feel the same way. Therefore, I strongly support Dr. Yeh's promotion to Associate Professor with Tenure. Please don't hesitate to contact me should you have any questions.

Best Regards,

Andrew Tsourkas, Ph.D
Professor and Undergraduate Chair
Co-Director, Center for Targeted Therapeutics and Translational Nanomedicine (CT3N)
Department of Bioengineering
University of Pennsylvania

Telephone: 215-898-8167
Email: atsourk@seas.upenn.edu

Sunday, August 27, 2017 at 2:46:42 PM Central Daylight Time

Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Sunday, July 9, 2017 at 5:18:48 PM Central Daylight Time
From: Andrew Tsourkas
To: Cunningham, Carrie N
CC: Sakiyama-Elbert, Shelly E
Priority: High
Attachments: Tim Yeh Evaluation.pdf, Tsourkas-CV-2pages.pdf

Hi Dr. Sakiyama-Elbert,

Please find my evaluation of Dr. Yeh and a 2-page CV attached. If you have any questions or need any additional information, please feel free to contact me.

Best Regards,
Andrew

==========

Andrew Tsourkas, Ph.D.
Professor
Department of Bioengineering
University of Pennsylvania
Office: 110 Hayden Hall, 3320 Smith Walk
Mail: 240 Skirkanich Hall, 210 S. 33rd Street
Philadelphia, PA 19104
Telephone: 215-898-8167
Fax: 215-573-2071
Website: http://www.seas.upenn.edu/~atsourk/

> On Jun 7, 2017, at 7:19 PM, Cunningham, Carrie N <carrie.c@austin.utexas.edu> wrote:
>
> Dear Dr. Tsourkas,
>
> On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.
>
> If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).
>
> Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.
>
> Thank you for taking the time to assist us with this effort!
>
> Best regards,
> Carrie
> ----

CARRIE CUNNINGHAM, Executive Assistant
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

<Yeh Request External Reference Tsourkas.pdf><Yeh CV 060517.pdf><1_Tim Yeh_2015_Nature Communications.pdf><2_Tim Yeh_2014_ACS Nano.pdf><3_Tim Yeh_2017_JACS.pdf><4_Tim Yeh_2015_JACS.pdf><5_Tim Yeh_2016_Biophysical Journal.pdf>

Andrew Tsourkas, Ph.D.
Professor of Bioengineering
University of Pennsylvania

EDUCATION

Georgia Institute of Technology and Emory University, Atlanta, Georgia
Coulter Department of Biomedical Engineering
Ph.D. Biomedical Engineering, GT/Emory Joint BME Program, May 2002

The Johns Hopkins University, Baltimore, Maryland
Whiting School of Engineering
M.S. Mechanical Engineering, May 1999

Cornell University, Ithaca, New York
Sibley School of Mechanical Engineering
B.S. Mechanical Engineering, May 1997

POSITIONS:

2002-2004	Post-doctoral fellow, Department of Radiology, Harvard Medical School
2004-2010	Assistant Professor, Department of Bioengineering, University of Pennsylvania
2010-2015	Associate Professor, Department of Bioengineering, University of Pennsylvania
2015-Present	Professor, Department of Bioengineering, University of Pennsylvania
2008-2010	Assistant Director, Program in Targeted Therapeutics, ITMAT
2010-2016	Associate Director, Center for Targeted Therapeutics and Translational Nanomedicine
2016-Present	Co-Director, Center for Targeted Therapeutics and Translational Nanomedicine
2010-Present	Member, Graduate Group in Pharmacological Sciences
2013-Present	Member, Graduate Groups in Biochemistry and Molecular Biophysics
2012-2015	Board Member, Center for Molecular Imaging Innovation and Translation (CMIIT), Society of Nuclear Medicine and Molecular Imaging
2013-Present	Editorial Board, Scientific Reports (Nature Publishing Group)
2015-Present	Founder and Scientific Advisory Board Member, PolyAurum LLC
2015-Present	Founder and Scientific Advisory Board Member, Sonosolve LLC
2016-Present	Founder and Scientific Advisory Board Member, AlphaThera LLC

HONORS:

Abel Wolman Fellowship, 1997-1998, Johns Hopkins University
George Fellowship, 2000-2001, Georgia Institute of Technology
BMES Graduate Student Award, 2001, Biomedical Engineering Society
SAIC Student Paper Competition Winner, 2002, Science Applications International Corp.
NIH T32 Training Grant, 2002-2004, National Institute of Health
Early Career Award, 2005-2007, Wallace H. Coulter Foundation
George H. Stephenson Term Chair in Bioengineering, 2008 – 2010, Univ. of Pennsylvania
Invited Participant, 2008, NAE Indo-American Frontiers of Engineering Symposium
Invited Participant, 2008, NAE Frontiers of Engineering Symposium
CAREER Award, 2010-2015, National Science Foundation
Fellow, 2015, American Institute for Medical and Biological Engineering

PUBLICATIONS (selected from 84):

1. Thawani, J.P., Amirshaghaghi, A., Yan, L., Stein, J., Liu, J., **Tsourkas, A.** (2017) Photoacoustic-guided surgery with indocyanine green-coated superparamagnetic iron oxide nanoparticle clusters extends progression-free survival in a pre-clinical mouse tumor model. *Small*. In press.

2. Wang*, H.H., Altun*, B., Nwe, K., **Tsourkas, A.** (2017) Proximity-based sortase-mediated ligation. *Angewandte Chemie*, 56(19), 5349-5352. (*contributed equally)
3. Nwe, K., Huang, C-H., Qu, F., Warden-Rothman, R., Zhang, C.Y., Mauck, R.L., **Tsourkas, A.** (2016) Cationic gadolinium chelate for magnetic resonance imaging of cartilaginous defects. *Contrast Media and Molecular Imaging*, 11(3), 229-235 PMCID:PMC4892988.
4. Hui, J.Z., Tamsen, S., Song, Y., **Tsourkas, A.** (2015) LASIC: Light activated site-specific conjugation of native IgGs. *Bioconjugate Chemistry*, 26(8), 1456-1460.
5. Al Zaki, A., Hui, J.Z., Higbee, E., **Tsourkas, A.** (2015) Biodistribution and clearance of gold-loaded polymeric micelles using 0.9 and 5 nm gold nanoparticles. *Journal of Biomedical Nanotechnology*, 11(10), 1836-1846. PMCID:PMC4942304.
6. McQuade*, C., Al Zaki*, A., Desai, Y., Vido, M., Sakhuja, T., Cheng, Z., Hickey, R., Joh, D., Park, S-J, Kao, G.D., Dorsey, J.F., **Tsourkas, A.** (2015). A multi-functional nanoplatform for imaging, radiotherapy, and the prediction of therapeutic response. *Small*, 11(7), 834-843 (*contributed equally). PMCID: PMC4329028.
7. Al Zaki, A., Joh, D., Cheng, Z., de Barros, A.L., Kao, G.D., Dorsey, J.F., **Tsourkas, A.** (2014) Gold-loaded polymeric micelles for computed tomography–guided radiation therapy treatment and radiosensitization. *ACS Nano*, 8(1), 104-112. PMCID: PMC3906892.
8. Hui, J.Z., **Tsourkas, A.** (2014) Optimization of photo-active Protein Z for fast and efficient site-specific conjugation of native IgG. *Bioconjugate Chemistry*, 25(9), 1709-1719. PMCID:PMC4166039.
9. Hui, J.Z., Al Zaki, A., Cheng, Z., McNitt, C.D., Popik, V., Zhang, H., Luning Prak, E.T., **Tsourkas, A.** (2014) Facile method for the site-specific, covalent attachment of full-length IgG onto nanoparticles. *Small*, 10(16), 3354-3363. PMCID:PMC4142076.
10. Cheng, Z, Al Zaki, A., Aspinwall, C., **Tsourkas, A.** (2014) Stabilized porous liposomes with encapsulated Gd-labeled dextran as highly efficient MRI contrast agents. *Chemical Communications*, 50(19), 2502-2504. PMCID:PMC3947407.
11. Zhang, X., Zajac, A.L., Huang, L., Behlke, M.A., **Tsourkas, A.** (2014) Imaging the directed transport of single engineered RNA transcripts in real-time using ratiometric bimolecular beacons. *PLoS One*. 9(1), e85813. PMCID:PMC3893274.
12. Zhang, X., Song, Y., Shah, A.Y., Lekova, V., Raj, A., Huang, L., Behlke, M.A., **Tsourkas, A.** (2013) Quantitative Assessment of Ratiometric BiMolecular Beacons as a Tool for Imaging Single Engineered RNA Transcripts and Measuring Gene Expression in Living Cells. *Nucleic Acids Research*, 41(15), e152. PMCID: PMC3753654.
13. Warden-Rothman, R., Caturegli, I., Popik, V., **Tsourkas, A.** (2013) Sortase-Tag Expressed Protein Ligation (STEPL): combining protein purification and site-specific bioconjugation into a single step. *Analytical Chemistry*, 85(22), 11090-11097. PMCID: PMC3843242.
14. Cheng, Z., Al Zaki, A., Hui, J.Z., Muzykantov, V.R., **Tsourkas, A.** (2012) Multifunctional Nanoparticles: Cost versus benefit of adding targeting and imaging capabilities. *Science*, 338(6109), 903-910. PMCID: PMC3660151.
15. Huang, C-H., Nwe, K., Al Zaki, A., Brechbiel, M. **Tsourkas, A.** (2012) Biodegradable polydisulfide dendrimer nanoclusters as MRI contrast agents. *ACS Nano*, 6(11), 9416-9424. PMCID: PMC3508381
16. Crayton*, S.H., Elias*, D.R., Al-Zaki, AW, Cheng, Z., **Tsourkas, A.** (2012) ICP-MS analysis of lanthanide-doped nanoparticles as a non-radiative, multiplex approach to quantify biodistribution. *Biomaterials*, 33(5), 1509-1519. (*contributed equally). PMCID: PMC3237748.
17. Chen, A., Davydenko, O., Behlke, M.A., **Tsourkas, A.** (2010) Ratiometric BiMolecular Beacons for the sensitive detection of RNA in single living cells. *Nucleic Acids Research*, 38(14), e148. PMCID: PMC2919734
18. Cheng, Z., Thorek, D.L.J., **Tsourkas, A.** (2010) Gd-conjugated dendrimer nanoclusters as a tumor targeted T1 magnetic resonance imaging contrast agent. *Angewandte Chemie International Edition*, 49(2), 346-350. PMCID: PMC2862691
19. Cheng, Z., Thorek, D.L.J, **Tsourkas, A.** (2009) Porous polymersomes with encapsulated Gd-labeled dendrimers as highly efficient MRI contrast agents. *Advanced Functional Materials*, 19(23), 3753-3759.
20. Thorek, D.L.J., **Tsourkas, A.** (2008) Size, charge, and concentration dependent uptake of iron oxide nanoparticles by non-phagocytic cells: a comparative study of USPIO, SSPIO, and MPIO. *Biomaterials*, 29(26), 3583-3590. PMCID: PMC2518173
21. Chen, A.K., Behlke, M.A., **Tsourkas, A.** (2008) Efficient cytosolic delivery of molecular beacon conjugates and flow cytometric analysis of target RNA. *Nucleic Acids Research*, 36(12), e69. PMCID: PMC2475621

Subject: Re: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh
Date: Tuesday, July 11, 2017 at 1:45:10 PM Central Daylight Time
From: Beth Gwinn
To: Cunningham, Carrie N
CC: Sakiyama-Elbert, Shelly E

Dear Ms. Cunningham,

My apologies for the slow reply. I have been dealing with my parent's health emergencies.

I am unfamiliar with Dr. Yeh's work since his time as a postdoc, and do not have time to review his work in enough depth to provide a useful reference.

Sincerely,
Beth Gwinn
Professor of Physics
UCSB

On Mon, Jul 10, 2017 at 9:05 AM, Cunningham, Carrie N <carrie.c@austin.utexas.edu> wrote:

> Just a friendly reminder of the request below for a letter for Dr. Hsin-Chih "Tim" Yeh's promotion to Associate Professor at The University of Texas at Austin.
>
> If you are still able to assist, please advise when you might be able to provide a letter. We do have some flexibility on the deadline. We greatly appreciate your assistance with this process.
>
> Best,
>
> Carrie
>
> ---
>
> CARRIE CUNNINGHAM | Executive Assistant
>
> The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu

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From: "Cunningham, Carrie N" <carrie.c@austin.utexas.edu>
Date: Wednesday, June 7, 2017 at 6:18 PM
To: "bgwinn@physics.ucsb.edu" <bgwinn@physics.ucsb.edu>
Cc: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: Promotion Reference Request for Dr. Hsin-Chih "Tim" Yeh

Dear Dr. Gwinn,

On behalf of Professor and Chair, Dr. Shelly E. Sakiyama-Elbert, I write to request your evaluation of Dr. Hsin-Chih "Tim" Yeh for promotion to the title of Associate Professor with Tenure in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request with instructions for an evaluation, as well as Dr. Yeh's current CV, and a selection of his five most significant publications in rank.

If you are able, please provide your evaluation by **Friday, July 14**. An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Dr. Sakiyama-Elbert directly at sakiyama@utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,

Carrie

CARRIE GWINN-HOWAY, Executive Assistant

The University of Texas at Austin | Department of Biomedical Engineering | 512.471.6705 | www.bme.utexas.edu